

OCT 21 1929

AUTOMOTIVE INDUSTRIES

Volume 61
Number 16

PUBLISHED WEEKLY AT CHESTNUT AND 56TH STREETS
PHILADELPHIA, OCTOBER 19, 1929

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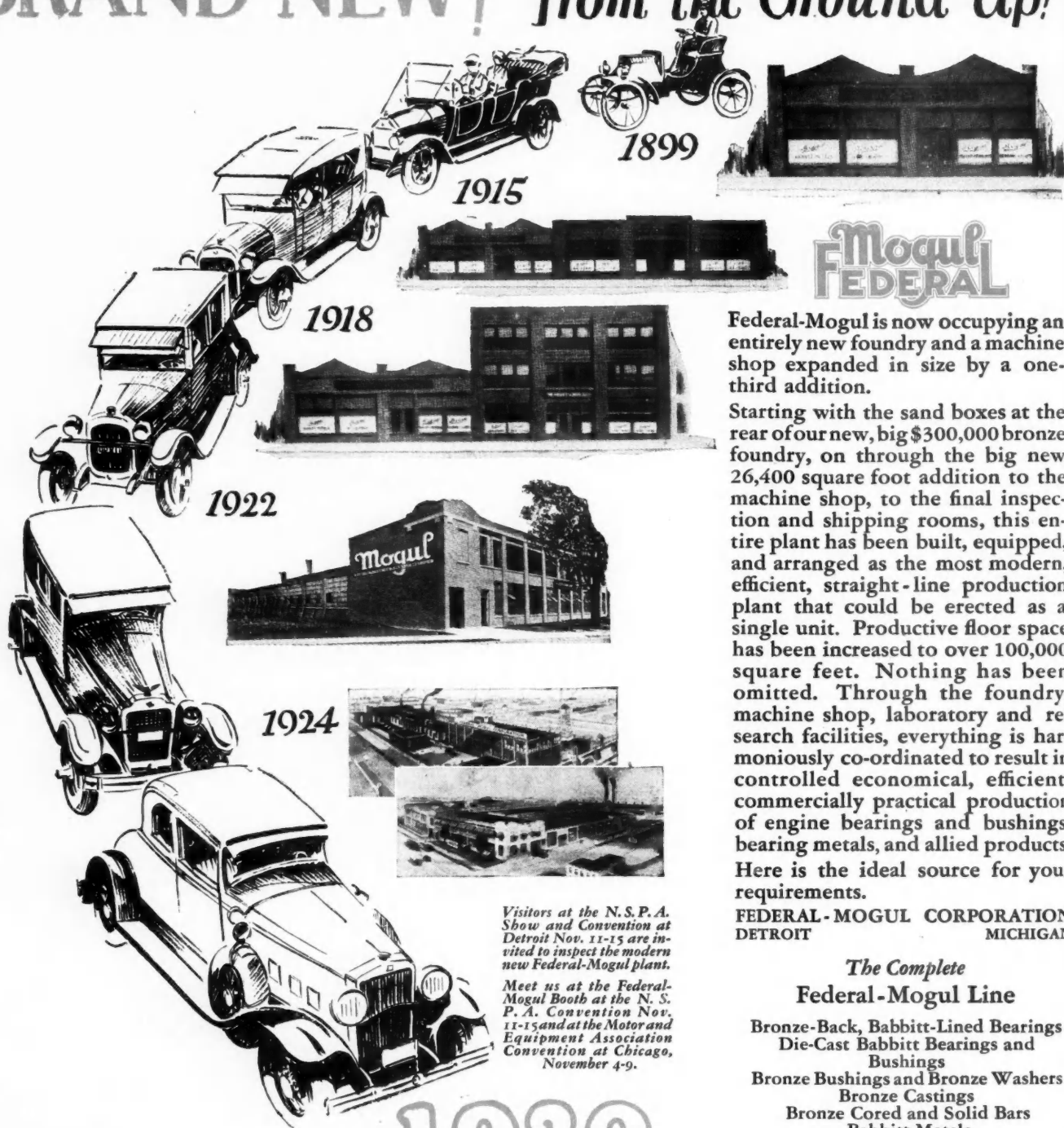
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1929

AUTOMOTIVE INDUSTRIES

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Vol. 61

No. 16

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Automotive Industries is published every Saturday by
CHILTON CLASS JOURNAL COMPANY
Chestnut and 56th Streets, Philadelphia, Pa.

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J. S. HILDRETH, Vice-Pres. and Director of Sales
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Controlled by United Business Publishers Inc., 239 West 39th Street, New York;
ANDREW C. PEARSON, Chairman, Board of Directors; FRITZ J. FRANK, President; C. A. MUSSELMAN, Vice-President; F. C. STEVENS, Treasurer.

SUBSCRIPTION RATES: United States, Mexico, United States Possessions, Canada and all countries in Postal Union, \$3.00 per year; Foreign, \$6.00 per year Single Copies 35c.

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Automotive Industries — The Automobile is a consolidation of the Automobile (monthly) and the Motor Review (weekly), May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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AUTOMOTIVE INDUSTRIES

VOLUME 61

Philadelphia, Saturday, October 19, 1929

NUMBER 16

Wall Street's Motor Stock Values Are Too Low, Say Executives

*Recent severe declines in prices of automobile securities
have less foundation in fact than the enthusiastic
rise of last year, consensus of leaders indicates.*

By NORMAN G. SHIDLE

"ARE the automobile companies approaching receivership?"

That was the rather startling query which A. R. Erskine, president of Studebaker Corp. of America, shot back at us when we asked his opinion as to whether or not automobile stocks in general are undervalued at their stock exchange levels of recent weeks and months.

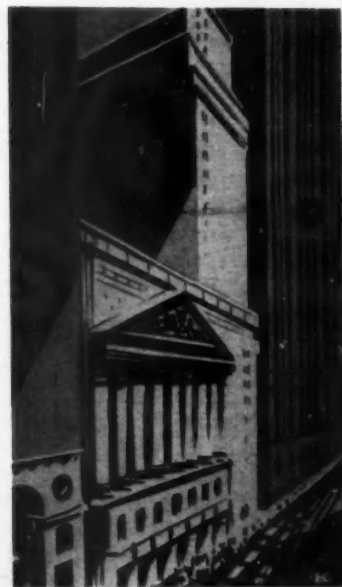
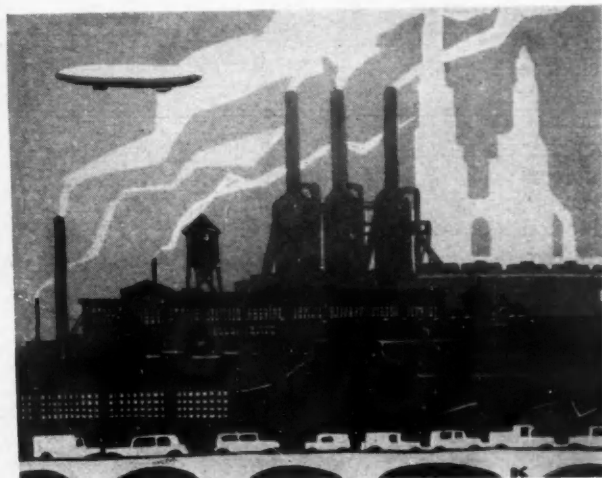
"One might think so judging by current stock market prices. Some prominent companies are selling in the market close to their actual net asset value, or, in other words, on a liquidating basis regardless of earnings and valuable trade names. Like the innocent bystander upon the scene of trouble, automobile stock prices have been injured by the general liquidation of an inflated stock market in the creation of which numerous automobile stocks did not participate. The condition is unwarranted."

This very emphatic

statement, while somewhat more vigorous than that expressed by some other executives, nevertheless does typify the ideas of a vast majority of passenger car company chief executives as regards the current status of automobile stock prices. One very important and very successful passenger car company president, to be sure, feels that practically every stock on the exchange, including automobile issues, is overvalued at present prices, but this executive seems to be expressing what is quite definitely a minority opinion. He believes the shares of his own company to be overvalued along with those of his competitors.

On the same side of the fence as Mr. Erskine, however, we find no less powerful an automobile figure than Walter P. Chrysler, who says in no uncertain terms that "present low price levels of motor stocks are not warranted by business conditions."

The good-will value



of an important trade name in the passenger car field is emphasized by one chief executive as an outstanding element of value which Wall Street tends to neglect when it issues bearish statements on the automotive stocks and "is not inclined to favor automobile issues" at the present time. An automobile has a personality and an individuality, he points out, which, in his opinion, makes the privilege of putting a well-known name on a car worth literally millions of dollars—a fact which is true to a far more limited extent in the case of articles or products which lack these same elements of distinction and individuality.

Annual Calamity Chorus

Other prominent automotive men urge that it is not necessary to be an unreasoning Pollyanna about the future of the automobile business nor to expect immediate continuance of record-breaking production performances, to feel that automobile stocks on the average are undervalued by Wall Street at their current levels.

Wall Street operators and the financial world generally has literally made millions of dollars from the automobile industry in the last decade or two, it is being said in automotive circles, and yet there still seems to be a tendency in those quarters to turn against the securities of the industry as soon as one or two poor business months are encountered.

For twenty-five years the automobile business has continued to go forward to sounder and more stable conditions in the face of annual predictions that it was just on the verge of disaster. One might be entitled to the suspicion that the quick and loud chorus of calamity howlers which comes on the stage every time the industry fails to set a new production record is inspired by the eagerness of previously false prophets to find some indications of the transpiring of their dire prognostications.

In this connection, a statement made by one passenger car company president who has been associated with the industry for many, many years will strike a responsive note in the thoughts of all automotive men of long standing.

"I am not alarmed," he writes, "over the stock market nor the thoughts and opinions of bankers and brokers. From the very beginning of the industry bankers strenuously opposed the automobile and in spite of that opposition the automobile industry has continued to grow until it is today the greatest industry in the world. It grew because it formed the most flexible and valuable form of transportation the world has ever known and transportation is the first essential after food and clothing. The opinion which was not then correct cannot now be correct."

Admittedly the automobile business has before it very definite problems awaiting solution. In the engineering, the marketing and the production fields there are many questions which have not yet been answered satisfactorily. It is not, however, unique among industries in this respect, as one might sometimes be led to believe from perusal of general business surveys and financial and market discussions. Its problems, while serious, are, with few exceptions, not acute.

Some progress has been made consistently every year toward the solution of almost every one of them. Every year the industry as a whole becomes steadier.

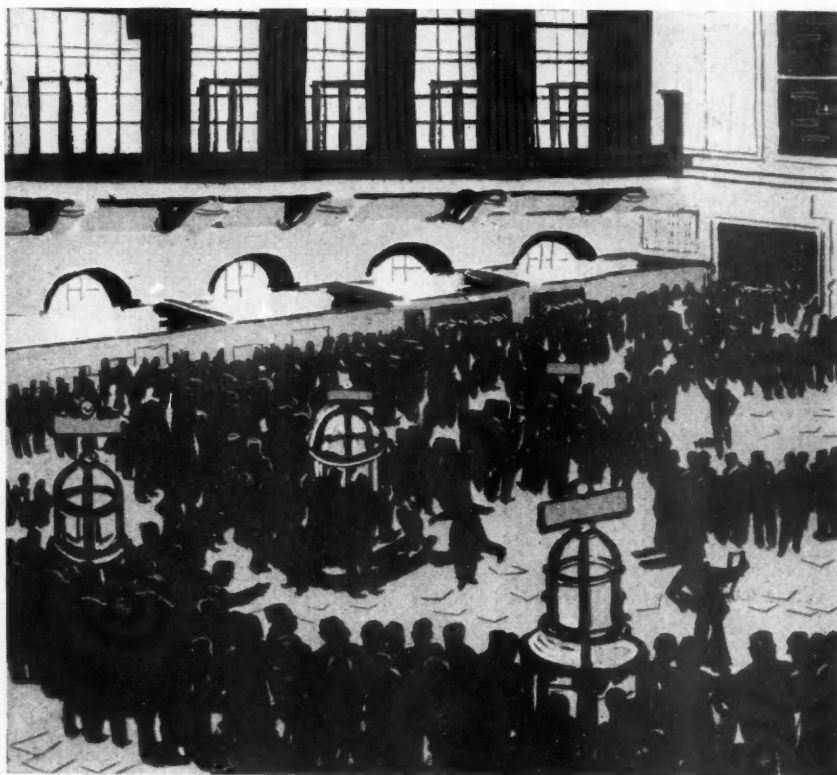
Management methods within a particular company, of course, are likely to be the chief basic factor in determining what should be the real value of the stock of a particular organization. On this one point, practically every automotive executive questioned agreed. The president of one very successful company, for example, giving his opinion recently about the value of the stock of another important automobile organization, said something like this:

"Under present conditions if it were liquidated it would be worth about 15 cents on the dollar. Put a new management into control, however, which was efficient, thorough and consistent, and the fundamental value of its present securities might be doubled overnight, merely because of the change in that one element which is basic to all others in the creation of stock values."

Management and Real Value

Depending partly on training and partly on general point of view, of course, different executives feel differently about the difficulties involved in obtaining the sound type of management which all agree to underlie the market value of the securities of any company. One big leader, for example, says: "Good management can always be bought." Another says: "That isn't nearly so easy to do as it sounds, regardless of the amount of money you have. You may lose millions while you're fishing around for the right management. A management or a management policy cannot be tested overnight. The testing process itself involves considerable financial risk and while it is going on inevitably would keep down the real current value of the securities of the corporation."

Chief executives of motor car companies, while they may in one sense be considered biased commentators on the value of the stocks of their own and competi-



tive companies, must, in a fuller and broader sense, be recognized as being more competent than anyone else to judge the basic stability and the fundamental soundness of the values behind the various motor stocks and of the relation of current levels of those stocks to these fundamental values.

As a result of seeking the opinion of such executives on this subject, the general conclusions expressed in this article have been based on expressions from executives of companies whose combined outputs comprise more than 65 per cent of the total output in the industry exclusive of Ford. In the opinion of these men, motor stocks generally have been much undervalued recently.

The frequent lack of relation between stock market and basic economic values so far as motor stocks are concerned is emphasized frequently in the letters and conversations of these men. One executive, for example, says:

"The Wall Street valuation of a stock never has had any tangible relation to its earning value. Public opinion is the big factor and public opinion is largely a matter of publicity. I would almost go so far as to say that the present precipitous drop in motor stock prices is due to negative propaganda and that an equal amount of favorable publicity would turn the whole market abruptly the other way."

Another one expresses the opinion that "the stock market has very generally liquidated automobile stocks as a class; the present value placed on automobile stocks is ultra-conservative."

No Justification for Hammering

The feeling of still another chief executive is that "practically all automobile stocks are extremely underpriced in view of present and potential earnings. . . . I do not believe there is any justification whatever in the hammering of automobile stocks by certain investment houses."

Commenting on the price of the stock of his own company, one executive says: "We don't worry much whether

our market values go down slightly or up slightly. They will ultimately find their proper level, of that we are sure. They will be higher soon I think." Practically every other executive contacted felt that the recent current levels of the stock of his own organization were lower than would be justified by proper consideration of current business and future prospects.

Only Two Executives Disagree

The presidents of only two companies out of the fifteen or more quizzed felt that motor stock prices were too high rather than too low. One of these two says: "It seems to me that the stocks of some companies in the automobile business have been much too high. It would seem that brokers would be perfectly justified in advising their clients not to purchase some of the stocks at the prices quoted. I think the brokers and investment houses in New York and other cities know as much about the industry as do we who are connected with it, although no doubt they sometimes fail to act on the basis of correct information."

Certainly automobile stocks haven't been very popular with the trading element on the exchange lately, despite the fact that a good many automobile companies have been having a better year this year than they did last. While some issues undoubtedly were overvalued in the bull market of the last year or so, there seems to be little economic justification for the nose-dive done by many automotive securities in recent weeks—even before the general severe declines which took place on a few days within the last week or two.

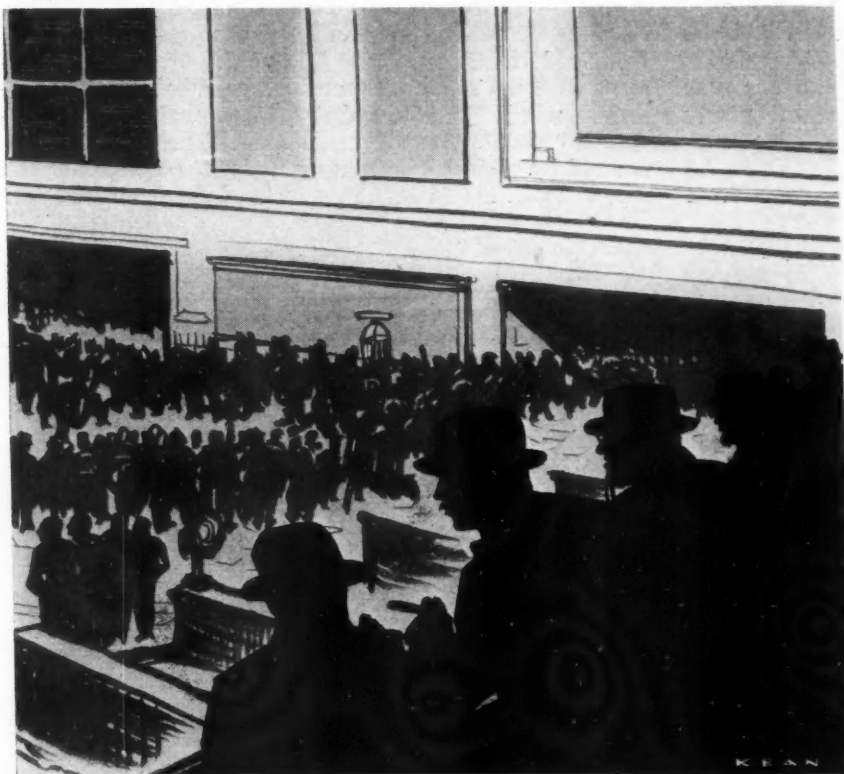
Unquestionably, just as some motor stocks ran up by leaps and bounds last year on the basis of information that had little to do with the basic economic status of the companies, so some of them have gone even further the other way with even less foundation in economic fact. Examination of all the elements involved makes this view of the situation reasonable even when the relatively quiet fourth quarter which is developing for automobile manufacturers is taken into account.

Those financial interests which have been ever blind to the future possibilities of the automobile industry cannot be considered sound guides as to the future today. Regardless of whether automobile stock prices go up or down—and obviously either may occur—there is inherent in the industry today a stability and a basic economic value which warrants a favorable view of motor stocks from a real worth standpoint.

The recent statements by L. A. Miller, Willys-Overland's new president, and R. H. Scott, president of Reo, to the effect that the public's ability to absorb automobiles has constantly been overestimated by car manufacturers are further indications that even greater stability and soundness are to be expected in the industry.

These statements, indicating a clear and public recognition by important factory executives of a long existing situation, reinforce rather than detract from the conclusions about basic values of motor stocks derived from analysis of executives' opinions.

Frank recognition of a condition is the first step toward finding a means of avoiding future pitfalls.



Rolls-Royce Phantom II Has Which Increases Power

*New 40-50 h.p. six has Hotchkiss drive
torque tube and cantilever suspen
spur differential, using hypoid*

By M. W.

THE brief particulars given in my cable in *Automotive Industries* of September 21, concerning a new model of the 40-50 hp. six-cylinder Rolls-Royce (styled Phantom II) can now be supplemented by details of the new features. Its principal variations from the earlier design are: A new cylinder head of a turbulent type giving 15 per cent more power with the same bore and stroke ($4\frac{1}{2} \times 5\frac{1}{2}$ in.); higher maximum speed and increased acceleration; unit powerplant construction, the adoption of Hotchkiss drive with half-elliptic rear springs in place of a torque tube and cantilever rear suspension; the use of a hypoid bevel type for the final drive; a lower center of gravity due to a reduction of 2 in. in the height of the chassis frame from the ground; the provision of a three-point system of centralized chassis lubrication which carries oil even between the spring leaves, and the reduction of chassis weight by 230 lb., to approximately 3800 lb.

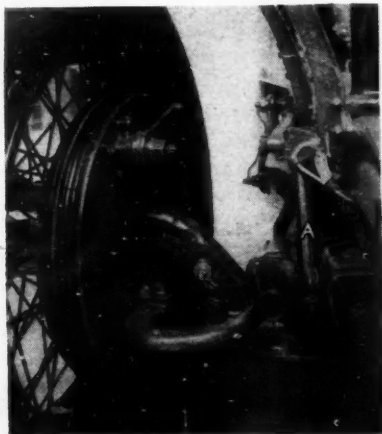
The engine, with a piston displacement of 4.68 cu. in., has pushrod operation for the overhead valves; the latter are located in line at a point in relation to the cylinder

bore which, in conjunction with the design of the combustion space, affords more pronounced turbulence and largely accounts for the 15 per cent increase in power output. The compression ratio is 4.6 to 1. Apart from

certain modifications in the carburetion and in the position of the spark plugs, the increased output can be said to be due to the turbulent head alone.

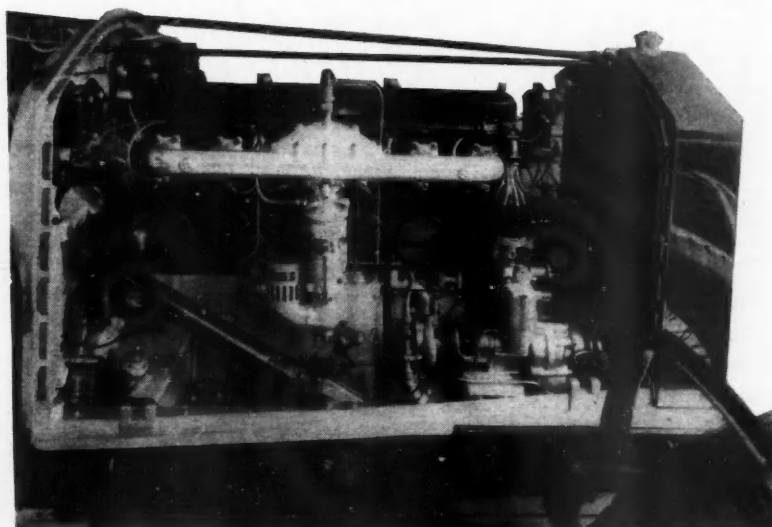
The cylinders are cast in two sets of three, set on a two-part aluminum crankcase in which the seven-bearing crankshaft of nickel chrome steel (machined and ground all over, but without vibration damper) is carried well above the joint of the top and bottom halves. The one-piece cylinder head is of aluminum with cast-in bronze seats for the valves, an arrangement adopted some time ago.

Four-point suspension within the main frame is provided for the engine, rubber disks being interposed between cross tubes passing through the crankcase and short brackets within the channels of the side rails. An unusual feature is a fifth support for the powerplant as a whole, for at the rear of the gearset is a small triangulated bracket supporting it at that point from a tubular cross member of the frame. The latter is distinctive in design. With channels of 6 in. maximum depth and $2\frac{3}{4}$ in. wide, it widens in plan at two points between the front end and the rear; the first point is in lateral alignment with the clutch pit and the second behind the gearset; thence to the rear end it is 37 in. wide, with a pronounced kick-up over the rear axle. The side rails are trussed by a steel rod running under the frame at each side between the adjacent brackets of the front and rear



Front axle end of the Rolls-Royce Phantom II (above). The arrow points to the single lubricator nipple for all steering and brake joints and other unsprung chassis bearings at this end. A is the shock-absorber link. Note the coiled spring on the brake drum to damp out squealing

Carburetor side of Rolls-Royce engine is shown at the right. The center of the aluminum inlet manifold is water-jacketed, and above it is the special carburetor for engine starting



Engine With *Turbulent Head* Output 15 Per Cent

with half-elliptic rear springs in place of sion. Rear axle is full floating with bevel gears for final drive.

BOURDON

spring anchorages. With one exception (a channel steel member above and just behind the rear axle) all cross members of the frame are tubular; there are eight in all of various diameters, including the two that pass through the crankcase.

Reverting to the engine, aluminum pistons are used and there are two sets of spark plugs, one on each side of the combustion chambers, for two entirely separate ignitions, battery and magneto are provided. Accuracy of synchronization throughout the timing range is claimed. Timing is by a hydraulic governor, as in the earlier type, which is connected to the contact breakers of both the ignition systems. Manual control of the timing is also fitted.

Throttle control by a governor is again utilized, with regulation up to a point by hand, and throughout the full range of throttle movement by accelerator pedal. The carburetor is of Rolls-Royce design, a two-jet device with an extra air valve coupled to a dashpot; an entirely separate carburetor is fitted for starting, a dashboard control enabling the driver to switch over to or from the main carburetor at will. A further control over the steering wheel is a mixture regulating lever intended for use only under extreme conditions, such as high or low atmospheric temperatures, high altitudes, very slow



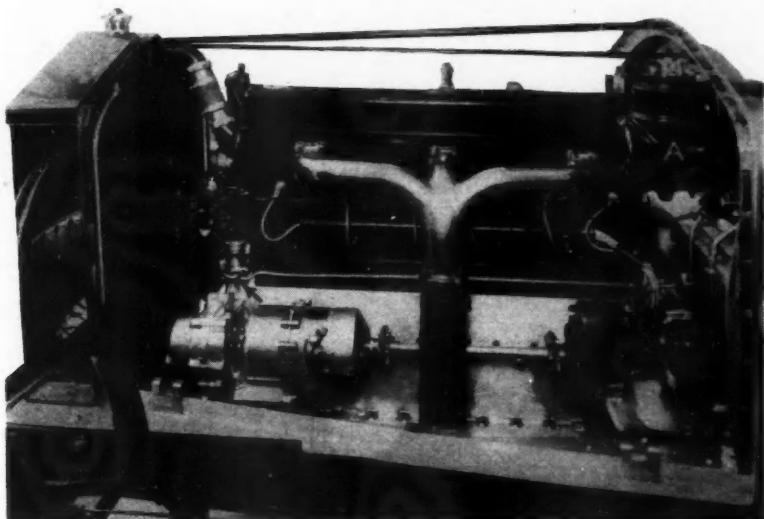
Rear end of chassis. New features here are the semi-elliptic springs (displacing cantilevers), the hypoid bevel final drive and the single oil-gun nipple (indicated by arrow)

pulling or in driving away immediately after the engine has been started from cold. Ordinarily it is set at about mid position and left there.

Inlet and exhaust ports are now on opposite sides of the cylinder head, there being six inlet ports on the right and three exhaust ports on the left. From the latter a three-branch exhaust manifold leads to a central down-take. The induction manifold is of cast aluminum with six separate branches, and differs from current practice in having curves in place of right-angle bends at each end.

Water heating has been substituted for exhaust heating for the induction tracts above the manifold riser, which again is contrary to current practice; the stated object is to avoid extreme conditions of temperature, the latter being constantly maintained within a narrow range by the provision of radiator shutters. Water circulation is through a round-tube cellular radiator in conjunction with a centrifugal pump. A remote-reading radiator thermometer is fitted with a dial on instrument board. The shutters are hand-operated, a red warning light on the instrument board glowing when the water temperature nears the boiling point.

The engine lubrication system is by pressure throughout, even to the wrist pins. A gear type of pump is employed, which delivers under high pressure the main bearings, connecting rods and wrist pins and through a



Exhaust side of Rolls-Royce engine. At A is the vacuum pump serving the Autovac tank on the dashboard

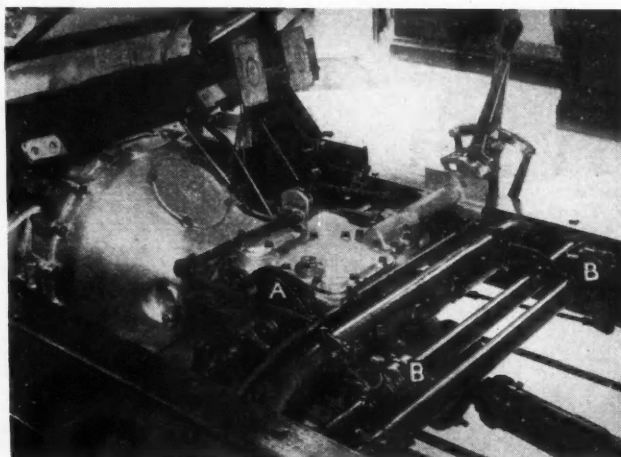
pressure-reducing valve to the front-end gears, over head valve rocker shaft and to the vacuum pump which is used for fuel feed. The latter embodies a specially made and unusually large Autovac tank on the dashboard, in which negative pressure is induced solely by the vacuum pump just mentioned, which is driven at half engine speed from the front end of the camshaft. The vacuum tank has a two-way tap which enables approximately half a gallon of fuel to be retained for emergency use. The main tank at the rear of the chassis holds 20 Imp. gals.

The aluminum clutch-pit, forming a forward extension of the gearset, completely incloses the flywheel with a hand-hole and cover plate. The clutch is of the single dry-plate type. Four speeds are provided by the gearset, which has ground gears for the constant mesh and indirect ratios. The open tubular propeller shaft is of 2¼ in. diameter with star-type metallic universal joints. The rear axle, of the full floating type with a spur differential, incloses hypoid bevel gearing, as already mentioned, the ratio being 3.7 to 1.

Rear springs are 66 in. long, shackled at the rear and pin-jointed at the front end.

The Rolls-Royce double-acting hydraulic shock absorbers are fitted to both axles.

The braking equipment follows previous Rolls-Royce practice, embodying a mechanical servo for the four-wheel brakes actuated by pedal, with separate shoes in the rear drums for hand operation; these are now of the same diameter as the pedal-operated shoes, instead of being concentric with and of smaller diameter than the latter. The steering gear is of the worm and nut type as in the earlier model and only detail variations have been made in the lay-out, which includes ball joints for the track rod as well as for the drag link. Triple-spoked detachable wire wheels are standard with Dunlop 'silent' tires 33x6.75 in. on 21 in. wheelbase rims.



Clutch pit and four-speed gearset. At A is the mechanical brake servo and BB are the front and rear brake equalizers

pins and steering rod joints, while the nipple at the center of the rear axle is connected to the brake camshafts and brake lever shafts.

The pedal-operated feed is carried to the steering gear, steering arm joints, spring shackles and pins, shock absorber shaft bearings, shock absorber ball joints, clutch shaft, clutch and brake pedal shafts, front and rear brake equalizer shafts and brake servo. From each spring eye a duct leads to the contact points between the main and second spring leaves and thence by grooves and small holes to the ends of the next three or four shorter leaves. The springs are inclosed in gaiters which prevent dust and water from entering between the leaves.

This system of what may be termed semi-centralized chassis lubrication has been adopted in order to avoid the use of flexible pipes or connectors between the frame and the unsprung details. Solid-drawn brass tube is used throughout, secured rigidly to the frame and other stationary units. Regulating valves are provided at numerous points to set the rate of feed and reservoirs are located where the requirements may vary.

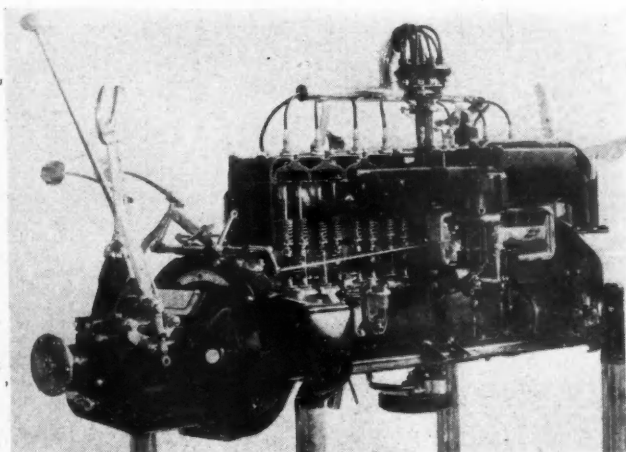
The new chassis is being offered in two lengths of wheelbase, viz., 144 and 150 in., the track in both cases being 58½ in. Chassis prices are the same as previously, viz: £1,900 and £1,880.

Studebaker Engines Exhibited at Paris Show

AMONG the many interesting American displays at the Paris automobile salon in the Grand Palais last week were cutaway models of the Studebaker President and Commander eights. As can be seen from the accompanying illustration, the working model of the President eight was mounted to demonstrate the operation of the engine. Sections of the crankcase and cylinder block were removed to show the crankshaft, the vibration damper, main bearings, piston and connecting rod. Small lights were used at the end of the spark plugs to indicate the combustion of fuel as the engine turned over under power of an electric motor.

The entire cooling and lubricating systems were revealed in detail, even to the drilled oil passages in the crankshaft, oil pump, thermostatic valve.

The two engine models, finished in chromium plate and gold and black enamel, were valued by the company at \$3,000 each.



Sectioned model of the Studebaker President eight exhibited at the Paris show last week

Radiographic Analysis of Metals Suitable for Stressed Parts

The field of advantageous use is determined by balancing the cost, which is comparatively high, against the benefits obtainable through accurate inspection.

By WILLIAM L. FINK and R. S. ARCHER
Research Bureau, Aluminum Co. of America

ABOUT two years ago radiographic equipment was installed as regular adjunct to the production plants of the U. S. Aluminum Company at Cleveland, which is engaged in the manufacture of sand castings, permanent mold castings, die castings and forgings of aluminum and magnesium. The results obtained have been considered of sufficient value to justify the installation of an X-ray laboratory at the company's new foundry at Fairfield, Conn.

The X-ray apparatus, which was installed in Cleveland, was developed and placed on the market for both diagnostic and deep therapy medical work. The rated maximum voltage was 200,000 volts, and this proved to be adequate to produce good radiographs of steel specimens up to about 2¼ in. in thickness and for aluminum specimens up to about 10 in. in thickness.

The outfit was installed as shown in Figs. 1 and 2. The interior walls of the X-ray room were lined with ⅛ in. sheet lead, and tests with dental films have shown that this is sufficient protection against X-rays.

The operator stands in the controlling room and views the tube through a window of two thicknesses of lead glass. The step-up transformer, rectifier and meters are placed in a room to one side of the control room. In the control room is a master switch of the no load circuit-breaker type. The solenoid of this switch is connected in series with the switches in all of the doors to the X-ray and transformer rooms; con-

sequently, if any one walks into either the X-ray or transformer room the apparatus is automatically shut off.

General principles underlying radiography are well known. X-rays travel in straight lines like light, have the property of penetrating matter which is opaque to ordinary light, and affect photographic films in a manner similar to that of ordinary light. In passing through matter, X-rays are absorbed to an extent which is dependent upon the nature of the material. Denser materials absorb X-rays to a greater extent than the lighter materials. These properties

of X-rays make possible the production of radiographs (shadowgraphs) in which dark areas on the film represent regions of low density or thin sections and light areas on the film represent regions of high density or thick sections.

Radiography is fundamentally very similar to contact printing in ordinary photography. The set-up for both is shown diagrammatically in Fig. 3. In one case the light rays are absorbed by the silver grains in emulsion of the negative, and in the other the X-rays are absorbed by the atoms of the specimen. As pointed out above, voids or gas inclusions in the metal specimen will absorb less energy from the X-ray beam than will the surrounding metal, and corresponding dark spots will be obtained on the radiograph. On the other hand, a relatively dense iron or copper segregate in an aluminum alloy specimen

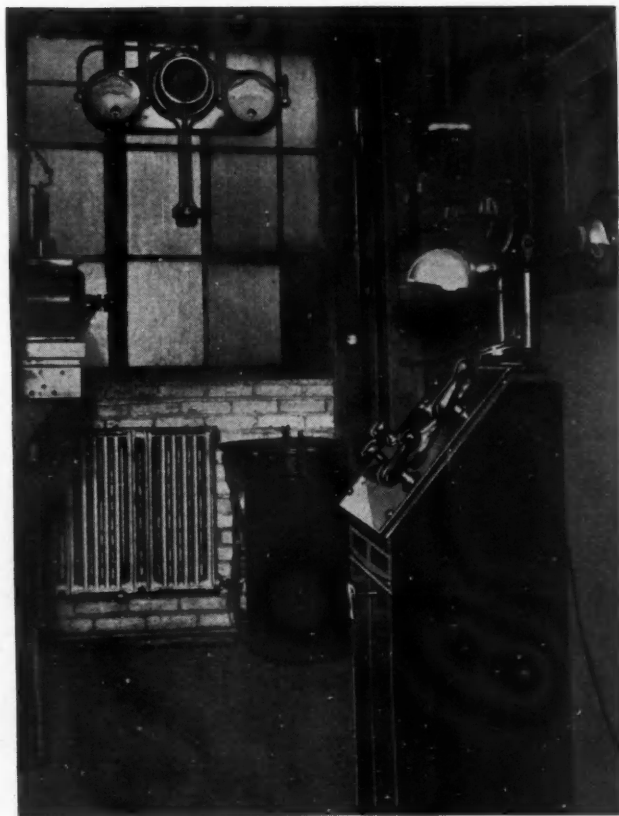


Fig. 1—Control room of radiographic installation for X-ray analysis of metals

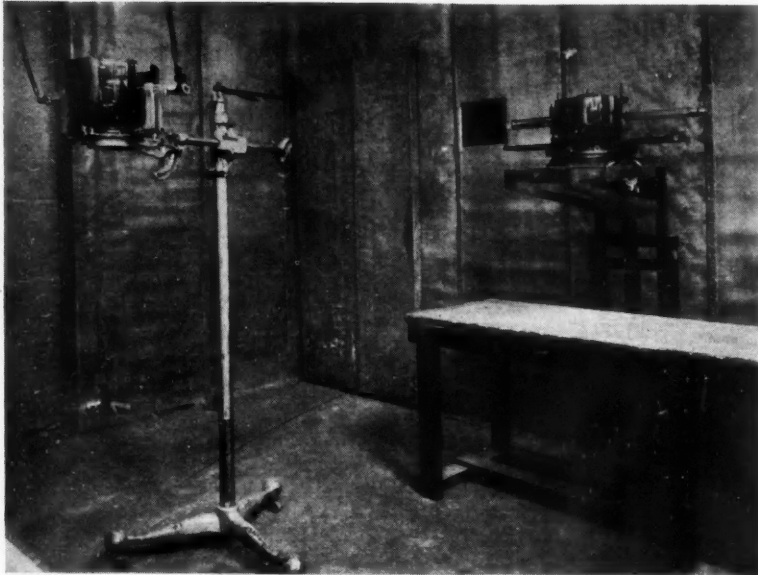


Fig. 2—The X-ray laboratory is lined with sheet lead

will absorb more energy from the X-ray beam than will the adjacent metal, and a corresponding light area will be obtained on the radiograph.

Radiography, however, is not as simple as contact printing. In some cases X-rays which are allowed to strike the film without going through the specimen will cause fogging for some distance under the specimen. This is especially true if calcium-tungstate screens are used.* Moreover, almost all work in metal radiography requires some precautions to reduce the effect of secondary radiation. Under the influence of primary radiation from an X-ray tube, all the nearby objects, including the specimen, become sources of X-rays known as secondary X-rays. These secondary rays, reflected from all angles, cause a general fogging of the film.

Fogging can be eliminated to a large extent by suitable blocking with lead sheet, lead shot or Barium clay, and by suitable use of filter screens.

The use of a broad or a fine focus tube, the distance from the tube to the film, the distance from the defect to the film, the voltage used on the tube, the time of exposure, the extent of filtering and other exposure conditions all have an important bearing on the quality of the radiographs obtained.

Most of the macroscopic defects in metals can be revealed by X-rays. Those which are most readily detected are shrinks, blow holes, pin hole porosity and segregates. Dross and other inclusions are usually detected but may in certain cases escape detection when the absorption coefficient is nearly the same as that of the metal. Fine cracks and laminations in

* Calcium-tungstate screens are placed next to the film to shorten exposure time. Calcium-tungstate transforms into light some of the X-ray energy which would otherwise pass through the film without assisting in the formation of the image.

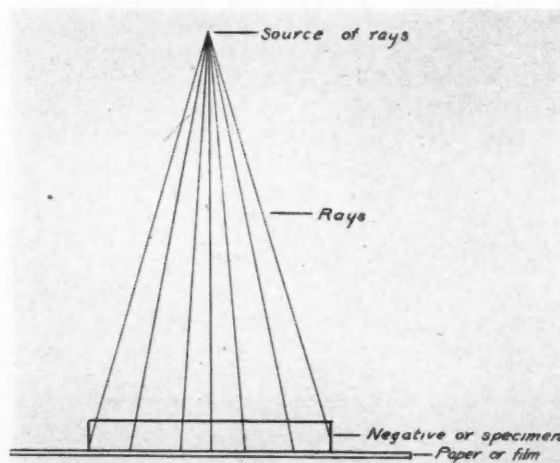


Fig. 3—Diagram showing relative location of parts in contact printing

forgings can be revealed easily, provided the X-rays pass through the specimen nearly parallel to the crack or lamination. However, if the X-rays pass through the piece normal to the plane of the lamination or crack, there is no indication on the radiograph that such a defect is present.

The appearance of some typical defects is shown in Fig. 4. Fig. 4a is a part of the radiograph of an aluminum alloy sand casting showing blow holes, pin hole porosity, and an inclusion of refractory material (the large elongated area at the right). Fig. 4b is an ordinary photograph of the section of the casting indicated by the white line on the radiograph (the white line is a pencil mark on the film). Figs. 4a and 4b are in vertical alignment.

Radiography is a rather expensive method of inspection, and, consequently, it is seldom used for 100 per cent inspection. There are, however, a few special cases in which X-ray analysis has been used to advantage for routine inspection. For example, a manufacturer of Diesel engines was interested in using aluminum connecting rods, but felt that the production on the particular engine in question was not sufficiently great to justify the expense of a forging die. On the other hand, these rods were subjected to severe conditions, and it was felt that the possibility of casting defects in some of the rods would ordinarily eliminate aluminum alloy sand castings from consideration. It was found that the sand-

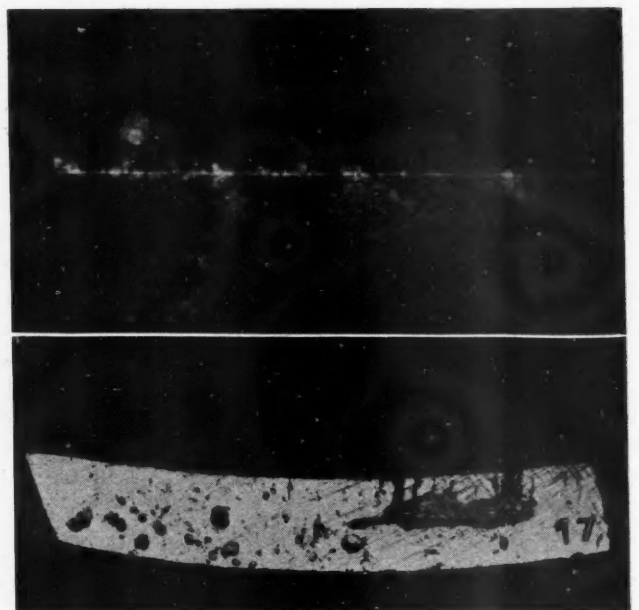


Fig. 4—Sand-cast aluminum specimen with blow holes. The upper picture is a radiograph (Fig. 4a) of the specimen while the picture below (Fig. 4b) is a section indicated along the faint gray line in Fig. 4a

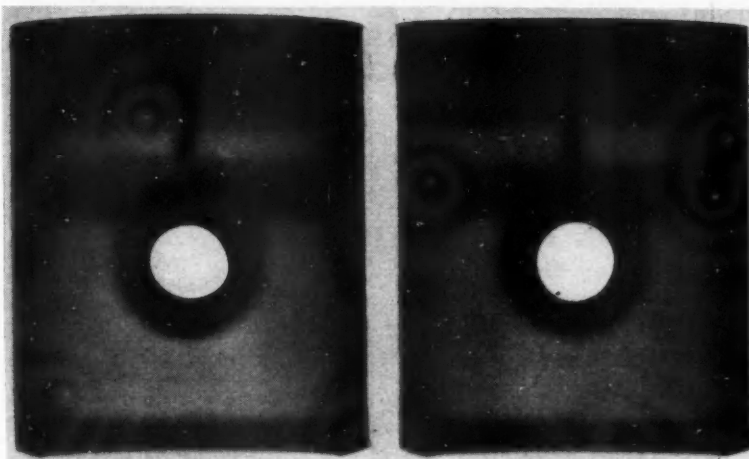


Fig. 6 (left)—Radiograph of aluminum alloy permanent-mold-cast piston, early sample, and Fig. 7 (right) radiograph of aluminum alloy permanent-mold-cast piston, later sample

cast, heat-treated aluminum alloy connecting rods which were selected on the basis of 100 per cent inspection were entirely satisfactory.

It has been found also that the inspection of an occasional casting taken at random from the general production will occasionally find defects due to inadvertent changes in foundry practice which were made after a satisfactory technique had been worked out.

As a result of Dr. H. H. Lester's well known work at Watertown Arsenal, he concluded that the most important use of radiography is the development of suitable fabricating methods. The experience in this laboratory has confirmed his conclusion.

Radiography has been helpful in getting die casting dies into satisfactory operation with a minimum delay. An example of this use of radiography is illustrated in Fig. 5. The upper shoe is one of the first castings produced in a new die. Several variations in operating conditions were tried, the results being followed by radiographic examination of the castings produced, and the method of operating which gave the best castings was adopted for production. The lower shoe is one of the better castings produced in the same die. The weights of the castings were correlated with the porosity as shown in the radiographs. After the parts were put into production, X-ray examination was eliminated, but each casting was weighed.

Figs. 6 and 7 show aluminum alloy pistons which were cast in a permanent mold. The piston shown in Fig. 6 was made soon after the mold was put into operation. The piston shown in Fig. 7 was made after some experimental work to determine a satisfactory method of operating the mold.

In the case of dies or permanent molds, changes in the methods of gating are expensive. In the case of sand castings, however, several methods of gating and chilling the castings can be tried in a short time at relatively low cost. Consequently, the most rapid progress has been made in the case of sand castings. Fig. 8a represents the first airplane shock absorber casting made from a new pattern. After four changes in the method of gating, checking the results of each change radiographically, a method was discovered which produced castings as shown in Fig. 8b.

The size of chills used and the position of the chills with respect to the gates and risers, are important factors in determining the amount of pinhole porosity. The effect of different methods of chilling on the

extent and the distribution of pin hole porosity is very easily followed by radiography.

The effects of melting practice, condition of the sand, kinds of cores, pouring temperature and methods of pouring upon the soundness of casting are readily followed by radiography. An example of such use is illustrated in Fig. 9, which represents a sand-cast dome for an outboard engine. Fig. 9a shows a casting poured with the ladle 12 in. above the mold. Fig. 9b shows a casting poured with the ladle as close to the mold as possible. This subject is covered more fully in another article.*

In the case of heavily stressed parts, break-down tests are made on sample castings with the loading identical or similar to that which the castings are to receive in service. This locates the points of maximum stress, and particular attention is directed to these areas. Gates, risers and chills are so located and proportioned that the soundest and strongest metal will occur at the point of maximum stress. In some cases the breaking load for the castings which are shipped to the customer is 50 per cent greater than that of the first casting produced.

The field of advantageous use of radiography in the metal industry is, of course, determined by balancing the costs against the benefits obtained. An analysis of the costs of making radiographs, including all items (depreciation, labor, materials, rent, taxes, heat, electricity, insurance, telephone, telegraph, etc.), shows that the cost has been approximately two dollars per square foot of film. These figures are for an average monthly consumption of 200 sq. ft. of film.

In the case of small parts it is frequently possible to put several parts on one 14 by 17 in. film, and

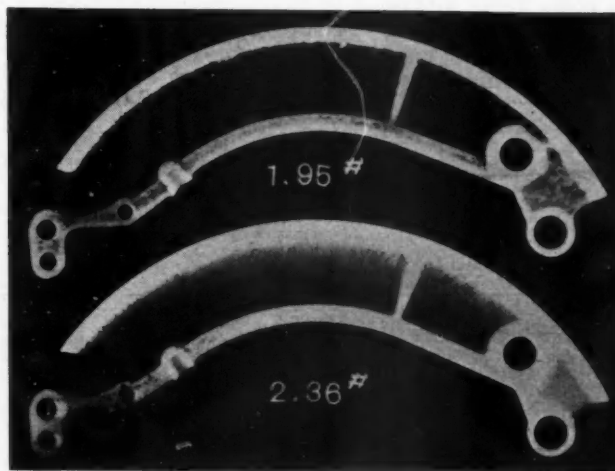


Fig. 5—Radiographs of die-cast brake shoes made under different operating conditions

thus reduce the cost per piece to well below a dollar. This is lower than the cost of the less satisfactory alternative method of sectioning and machining. It is not to be understood from this that the X-ray can completely replace machining tests. If the object of the test is to determine the kind of a surface the customer will obtain on machining, the machining test is the more satisfactory. If, however, the object of

* The Importance of Standard Pouring Heights for Aluminum Castings by D. B. Hobbs, *Foundry*, Sept. 1, 1929.

the test is to determine the soundness of a highly stressed part, machining is not comparable with radiography.

Another point to be considered is that of time. It is, in general, much quicker to radiograph a casting than to section and machine it. In some cases, such as certain die castings, one saw cut will give sufficient information, and it is quicker to section. Time is saved by lowering the standard of the examination.

Another factor which is far from negligible in determining relative costs is the salvage value of the castings after the examination. In approximately 90 per cent of the cases the first casting presented for examination is satisfactory. The casting is returned to the foundry and sold to the customer. If destructive tests had been used, the casting would have been reduced to scrap aluminum.

The cost of complete X-ray examination increases with the size of the casting. In one case the examination cost approximately \$50. In this case, however, information was obtained which could not have been obtained in any other manner, even at a greater cost, and the job, which had been given up by another foundry, was put on a successful produc-

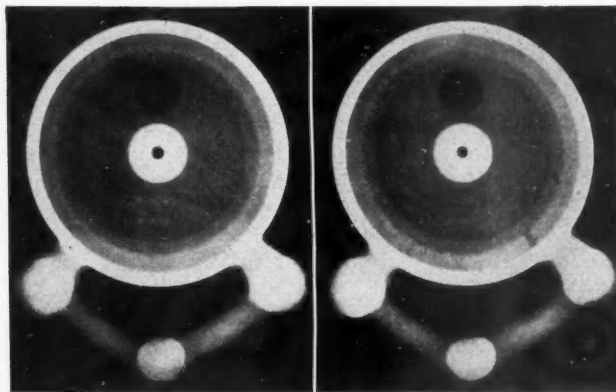


Fig. 9a (right)—Casting for outboard engine, poured with the ladle above the mold and Fig. 9b (left) casting poured with the ladle as close to the mold as possible

tion basis. In other cases it is not necessary to examine the entire casting.

Most of the radiographic work has been done on highly stressed parts, such as airplane parts, brake shoes, motor parts, etc. In such parts a very high standard should be maintained by a thorough check of the method before the parts go into production, and there is no doubt as to the advantage of X-ray inspection.

There are castings which are subjected to low stresses, such as ornamental castings, cover plates, etc. In these cases X-ray examination is usually unnecessary, and would increase costs without compensating benefits.

There are parts which cannot readily be placed in one class or the other. Cast cooking utensils, waffle irons, vacuum cleaner parts, etc., are of this type. Such parts have been radiographed when the usual methods of inspection—visual examination, buffing, fracturing, etc.—have indicated that the castings might not be satisfactory.

Acknowledgment is hereby made to L. E. Hess, who made the radiographs reproduced in this article.

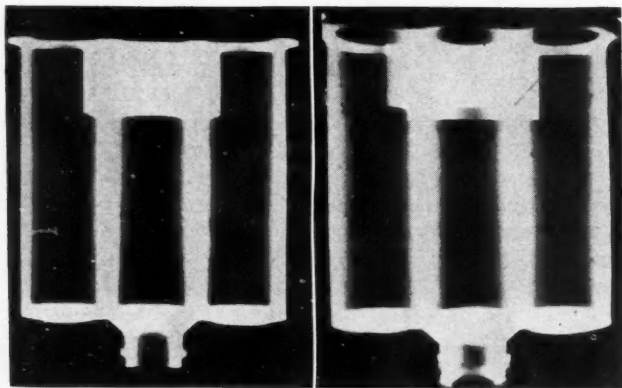
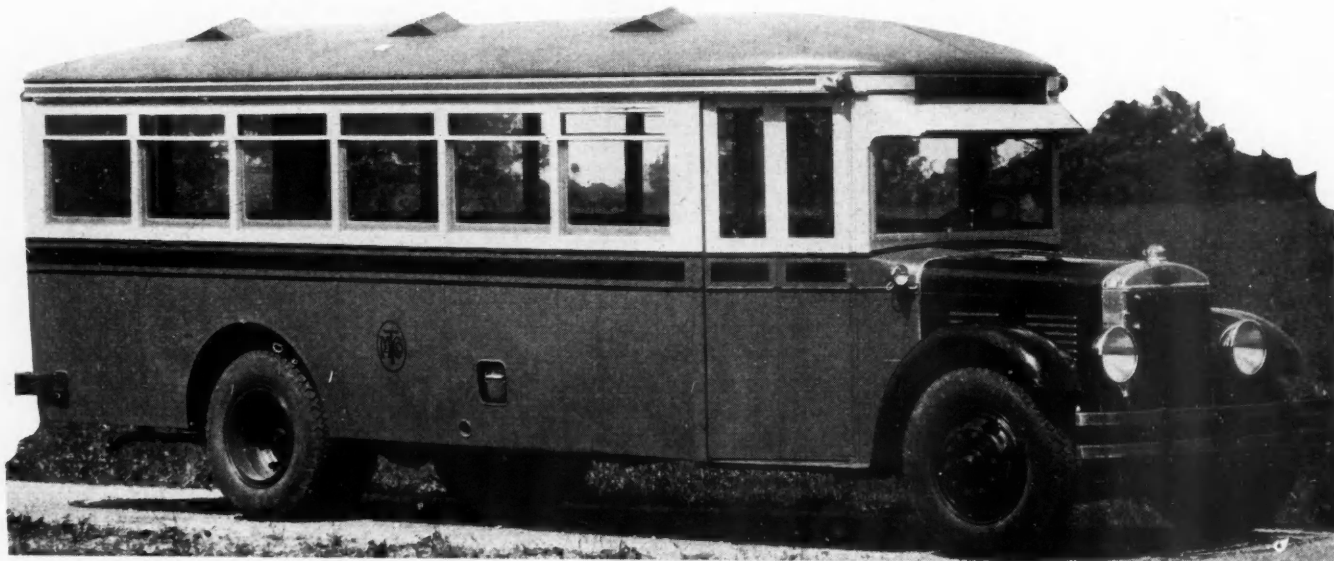


Fig. 8—Radiographs of airplane shock absorber casting. The early sample (8a) is on the right and the later sample (8b) is on the left

Mack Trucks, Inc., Offer BC Bus



The new six-cylinder Model BC bus of Mack Trucks, Inc., is announced for use where grades and traffic conditions require relatively high power. It has a 90-hp. engine

Bohn Interchangeable Bearings Produced on Low Cost Basis

Considerable saving is effected through the use of special machine tools designed by the company. These units operate with an accuracy that maintains the extremely close tolerances required.

By ATHEL F. DENHAM

IT is generally understood that an interchangeable bearing is one which is machined to precise limits, so that when assembled in an engine in which the crankcase bore and the crankshaft likewise have been held to precise limits it will have a specified oil clearance. However, the exactness of the methods used in the manufacture of the interchangeable type of bearing is not generally known or appreciated.

In the standard bearing, sufficient babbitt is left on the inside to permit line boring or reaming at assembly, and it is evident that by using an interchangeable type of bearing considerable saving in assembly costs can be effected by eliminating many hand operations, such as trimming the split faces of the bearings, placing or adjusting shims, assembling the caps, line-boring and reaming, facing off thrust bearings, checking with gages, and sometimes hand-scraping the bearing surfaces. The advantage in the use of interchangeable bearings to the car owner, of course, is that if a bearing is burned out in service due to lack of oil, it may be replaced quickly and cheaply without resorting to the old method of hand fitting, which is not only expensive but may be inaccurate.

It is, of course, quite obvious that a bearing, in order to be interchangeable, must be machined to very close limits. The Bohn Aluminum

& Brass Corp. states that the important tolerances and dimensions are as follows:

1. Diameter—0.0005 in. maximum variation.
2. Wall thickness—0.00025 in. maximum variation.
3. Distance from split face to back—0.00025 in. maximum variation.
4. Babbitt—0.032 in. thick.
5. Finish—a true surface with broached mirror finish.
6. Distance between thrust bearing flanges—0.001 to 0.002 in., depending on crankcase tolerances.

In addition to these, the following requirements must be met by an engine which is to be fitted with interchangeable bearings:

7. The engine should have pressure lubrication.
8. Crankshafts should be held to a tolerance of 0.001 in.
9. Crankcase bores should be held to a tolerance of 0.0005 in.
10. Crankcase bores should be parallel and in alignment.

Taking into consideration the large numbers in which interchangeable bearings are being manufactured now, it is quite apparent that the above mentioned limits are extremely precise for production work. It is absolutely necessary, however, to maintain these limits in order that proper oil

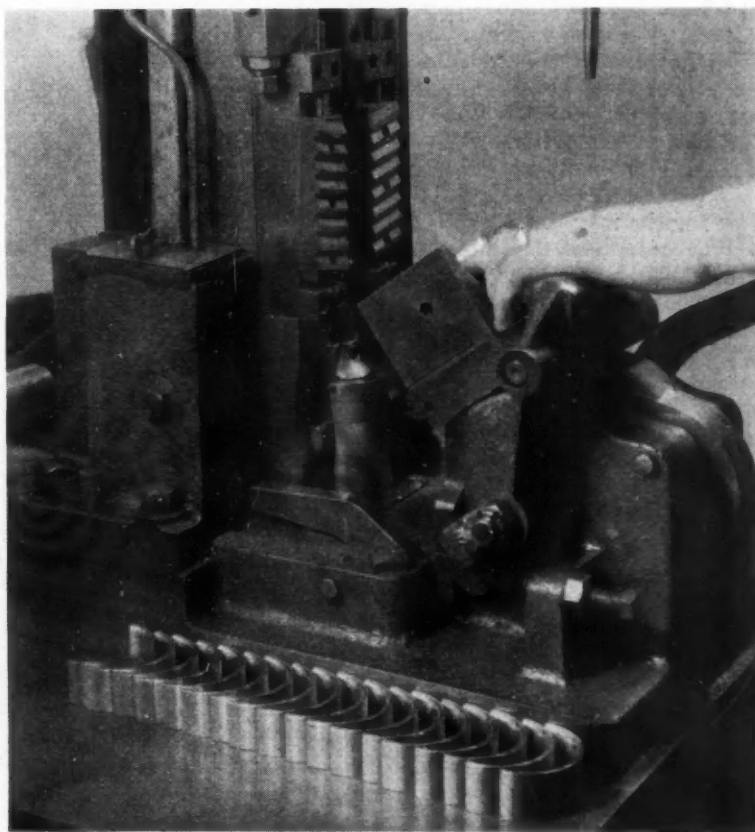


Fig. 1—This special vertical broaching press is used by Bohn Aluminum for finishing the split faces. Note the expanding plug for seating the shell in the fixture block

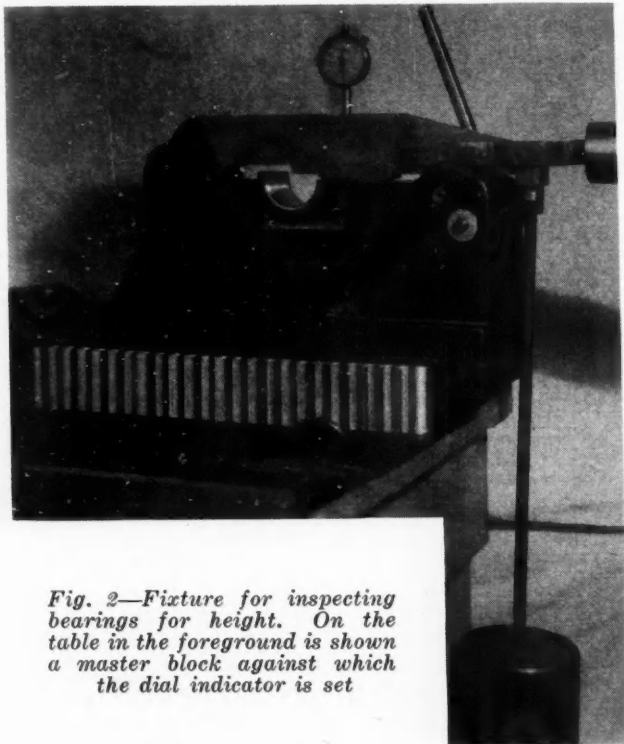


Fig. 2—Fixture for inspecting bearings for height. On the table in the foreground is shown a master block against which the dial indicator is set

clearance may be obtained when the bearings, crankcase, crankshaft and caps are assembled.

Holding the inside diameter of the shell to 0.0005 in. is necessary to obtain uniformity of oil clearance when the low clearances between shaft and bearing are taken into consideration. Furthermore, in order that this tolerance on the diameter will hold good after assembly, the wall thickness is limited to 0.00025 in. maximum variation. To obtain good heat transfer and a rigid bearing, the latter must be firmly seated in the crankcase. To this end the bearing halves are machined slightly oversize in circumference, but here again the tolerance must be held very small, viz.: 0.00025 in., so as to eliminate any chance of distortion arising from this source.

It is desirable to hold the babbutt thickness to 0.032 in. in order to allow for the maximum thickness of bronze in a given design, which, of course, makes for greater rigidity and also results in better heat dissipation, owing to the higher heat conductivity of bronze. Requirements 5 and 6 do not call for any explanation.

Practically all engines using interchangeable bearings employ a high oil pressure, and crankshafts and crankcases should be held to close limits in order to assure the proper oil clearance. When the interchangeable type of bearing was first put into use, it was thought that it would be impractical to attempt to maintain a tolerance of 0.001 in. in the diameter of the crankshaft and of 0.0005 in. on the crankcase bores. By practical experience it has been found, however, that with proper tooling such tolerances on both the crankshaft diameter and the crankcase bore may be easily adhered to, the proportion of rejections due to failure to meet the tolerance specifications being small.

It is not only necessary to maintain the above specified bearing tolerances in machining, but these tolerances must hold when the bearing is assembled in the engine. This,

of course, implies that the bearings must be finish-machined under conditions simulating final assembly. Specially designed machine tools for the final machining operations were found necessary to solve this problem, and, the requirements being unique, the Bohn Aluminum & Brass Corp. had to design these tools itself.

In the production of Bohn "Ring True" interchangeable bearings the key points are:

1. Obtaining the correct outer surface of the bearing shell.
2. The final broaching operations on the split faces and the inside bearing surface.

The machine tools used for these operations are illustrated herewith and will be referred to later. In order that these may be used with maximum effectiveness it is imperative that the preliminary machining operations be carried out in the proper manner.

The first operation on the cylindrical shell after it has left the foundry is the rough boring of the inside diameter. On certain thrust bearings where there is a babbutt face on the flanges there is a counterbore operation. Next the bearings are tinned. This operation is performed automatically, a hopper and conveyor being provided which take the bearings through the flux, tin and water quench baths, and accurately control the time element. Temperatures must also be closely controlled, and pyrometers are installed for this purpose.

Preceding the babbutting operation the shells are part-turned, to permit of locating them in the babbutting fixtures. It is then necessary to preheat the shell, and for this purpose specially designed gravity-feed preheating furnaces with automatic temperature control are used. In these furnaces the bearings are raised to such a temperature that the tin on the inside is in a molten condition on removal of the bearings from the furnace and the tinned surface is then cleaned with a high speed rotating brush, to remove oxides, and immediately placed on a centrifugal babbutting machine. These machines are designed to accommodate a number of bearings at one time, part of them rotating while the odd one is being loaded. The babbutt is injected

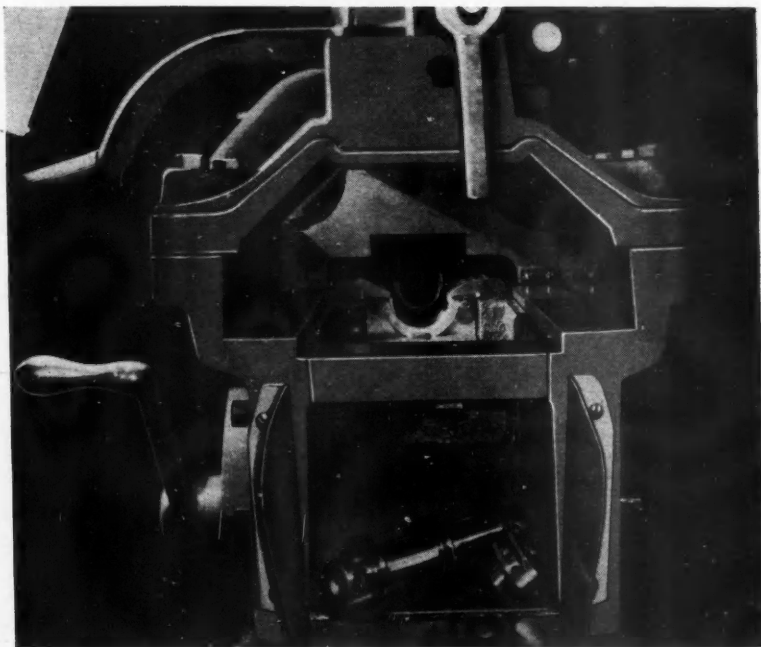


Fig. 3—Interior of the horizontal broach press used for finishing to wall thickness. In the foreground are shown the relief cutter and broach plates. Note the wide spacing between the latter to the end that one will finish its cut before the next one begins

into the bearing from a pyrometer-controlled melting pot, the outlet for the babbitt being near the bottom of the pot, so that any oxides or dirt on top of the molten babbitt will not be passed into the bearing shell.

Following the babbitting operation the inside diameter of the bearing is machine-bored, sufficient babbitt being left in to allow for the finish broaching operation. Flanged bearings are next faced, finish-machined on the outside diameter of the flanges, faced to size between the flanges, and chamfered on the inside diameters. The body diameter is part-turned in another operation. The corresponding operation on the plain bearing is a part-turning on a lathe.

Outside Diameters Finish-Ground

From here both types of bearings go to an external grinder where they are mounted on an arbor to have their outside diameters finish-ground.

During all of the preceding operations the bearings have been handled as complete shells, but from this point on must be handled as half-bearings. They are, therefore, split on milling machines equipped with single and double saws.

Up to now the bearing has been oversize in diameter to allow for the amount of material removed in the sawing operation. In order to bring each half to a full half bearing they are now placed on a specially designed fixture in a forming press. A radius block is brought down on the bearing, closing it in. With this fixture the bearing halves do not require definite locating and are pushed through from one side of the press to the other by a semi-automatic feed. Thrust bearings have their flanges machine-faced to the final size following this operation.

The bearing is now ready for the final broaching of the split faces. For this purpose a specially designed and patented vertical broach press with two sets of inclined broaching blades, shown in Fig. 1, is provided. The half bearing is placed in a hardened, ground and lapped block which is a detail part of the fixture representing the bearing cap or case. As the fixture is turned to the position for broaching the faces, adjustable locating fingers place the half bearing in position so the broaches remove an equal amount of stock on each side. The bearing half is held in this block securely by an expanding core which forces the shell to conform to the true diameter of the block, so that when the broaching cutters move down, the shell is held relatively the same as in the crankcase.

Inspection After Broaching

After broaching the split-faces, the half bearings are inspected to check the distance from the split face to the back. A special fixture or gage, shown in Fig. 2, is provided for this purpose. The shell is placed in a semi-cylindrical gage block, the true diameter of the bearing. A weighted arm applies uniform pressure to both of the split faces, one face butting against a locating plate, the other face being supported by a dial indicator which has been preset by means of a master gage. It will be noted that this method of inspection checks the circumference of the bearing, rather than the distance from the split face to the bearing back, thus giving a multiplication of 3.14 to 1 and permitting of correspondingly greater accuracy.

The bearing next goes to the milling and drilling department where minor operations, such as the machining of oil grooves and holes, are performed.

For finish broaching the bearing surface the specially designed horizontal broaching machine shown in Fig. 3 is used. For this operation the shell is placed in a

hardened, ground and lapped block, a detail part of the machine. The bearing is held in position by two clamps which pull down the split faces, conforming the outside diameter of the bearing shell to the true diameter of the crankcase bore. A specially designed broach with three or four circular cutters removes approximately 0.0005 in. of stock on a side. This special broach produces a mirror finish with no inequalities in surface. Relief cutters are furnished with the broach to provide side clearance on the inside of the bearing at the split faces approximating 0.0005 in. at the top and tapering to nothing $\frac{1}{4}$ in. from the split face. This operation eliminates side pinch of the bearing on the shaft at assembly. Ejector pins are provided in the holding fixture to facilitate removal of the bearing. The accuracy of this operation is partially due to the rugged design and close fits of this special machine.

As is often the case in quantity production, it was found that the high accuracy required with interchangeable bearings need not increase the cost of manufacture. When the Bohn Aluminum & Brass Corp. first introduced these bearings their cost was high, which was due to the production methods then used. But the development of special machine tools and concentration on the important elements in the manufacturing process have brought the total production cost down, so that at present the interchangeable bearings are said to be as cheap to produce as the non-interchangeable type.

Books for the Business Bookshelf

Foreign Trade in 1929

Published by National Foreign Trade Convention Headquarters, New York. \$2.50.

THIS is a verbatim report of the proceedings, the discussions, and the addresses at the general session and the specialized session of the Sixteenth National Foreign Trade Convention which was held at Baltimore, Md., April 17 to 19, 1929. Among the addresses contained in it is one on "Prospects of the United States Foreign Trade," by the Hon. Robert P. Lamont, Secretary of Commerce of the United States. Other features contained are specific data on markets and economic developments in foreign countries. Instalment selling, advertising, credit and other export topics of general interest were discussed at the convention. Of particular automotive interest is an address by John A. Hambleton, vice-president, Pan-American Railways, Inc., who spoke on "Air Transport for Commerce." The book has been distributed to all delegates to the Foreign Trade Convention and is available to others. It should be of interest to all automotive executives concerned with the problems of export sales.

Dictionary of Aeronautical Terms

J. Vanler, The American Society of Mechanical Engineers, New York. 141 pp.

THIS book contains two aeronautical vocabularies, the first arranged alphabetically according to German names, accompanied by English and French equivalents for the terms, and the second vocabulary arranged in the same manner, but according to French terms. The compiler of the Dictionary is a linguist of note now on the staff of the army air corps and has been assisted in his work by a number of specialists, so that the book represents present aeronautical terminology very accurately.

Two-way Action With One Cylinder In Thompson Shock Absorber

Resistance to return motion of chassis springs varies, owing to change of the effective length of lever arm through which piston acts on the crank.

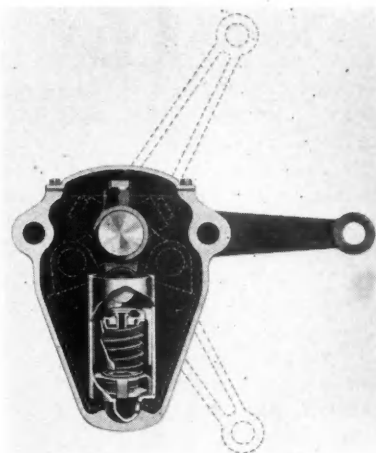
A SHOCK absorber which checks the return of the chassis springs toward their normal position in either direction, that is, from a compression or from a rebound, has been placed on the market by Thompson Products, Inc., of Cleveland, Ohio. The device comprises a housing, arm and shaft, crank, piston, valve set and rocking cylinder, and emphasis is laid by the manufacturers on the fact that although there is only a single cylinder, two-way action is obtained.

When the car spring is compressed, or when it rebounds, the external arm is either raised or lowered from its normal position, as the case may be. No resistance is offered to movement away from the normal position in either direction. This operation rocks the cylinder and raises the piston, drawing oil into the cylinder through the flat inlet valve at the bottom.

As the car spring returns to its normal position the direction of arm movement is reversed. A pressure is immediately produced in the cylinder and the inlet valve closes. When the pressure has been built up to a certain point, a spring-controlled tubular discharge valve in the piston head opens, which permits the oil to flow back into the reservoir. Until the piston reaches the end of its stroke the pressure in the oil in the cylinder is maintained at the point for which the discharge valve was set.

A sectional view of the valve assembly is shown by one of the drawings reproduced herewith. When the piston moves downward the pressure of the oil in the cylinder acts downward on area *A* and upward on area *B*. Since *A* is larger than *B*, valve *D* opens in a downward direction as the oil pressure in the cylinder becomes high enough to compress the spring *C*, permitting the oil to escape into the low pressure reservoir

Sectional view of Thompson Twincycle shock absorber showing the extent of arm lever movement

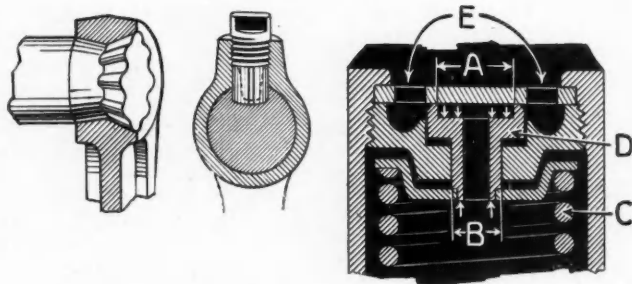


outside of the cylinder through the tubular valve *D* and holes *E*.

But while the resistance to the return motion of the piston is constant throughout its stroke, the resistance to the return motion of the chassis spring varies from point to point, owing to the change of the effective length of the lever arm through which the piston acts on the crank. Thus the shock-absorbing or spring-retarding force is a maximum when the return motion begins, and it gradually decreases to zero as the normal position is approached.

As regards details of construction, the shaft and piston pin are hardened and ground. This is an important point, since looseness of the shaft would soon destroy the packing and result in oil leakage. All valves are hardened and ground, and in the case of the discharge valve the seat also is ground. The cast iron housing is not subjected to high pressure and therefore is made light. Since the cylinder automatically aligns itself with the piston, there is no appreciable side pressure on the cylinder wall, hence the wear should be light. The shaft and arm are made separate and then joined by a patented process, which facilitates manufacture and permits of the use of an I-section for the arm, and thus reducing its weight. The main spring serves three purposes—holding the cylinder down against its ball seat during the suction stroke, holding the discharge valve to its seat, and taking up any backlash in the piston and shaft bearing. It is claimed that since the spring used is quite long and supple and the lift of the valve is only of the order of 0.004 in., there is no noticeable difference in the holding power due to differences in oil viscosity.

The new shock absorber will be made in three sizes at the Detroit plant of Thompson Products, Inc.



Serrated and riveted joint between shaft and arm (left). Joint between shaft and crank, made by means of a split, internally tapered sleeve of chrome-nickel steel and a set screw (center). Discharge valve assembly of shock absorber (right)

Short-Cuts to Economy Devised in Shop Operations

SHORT-CUTS to production economies are found in every part of the automotive plant today. A study of the practice in representative shops reveals the trend to mechanization as evidenced by the increasing number of full automatic operations.

Shop flexibility and adaptation of the tools in hand to the job by the new-day production man, are responsible for much of this progress. Unusual, unorthodox methods are employed to speed up output, reduce handling, and cut costs to still lower levels. Certain difficult operations which heretofore required special machinery are now done better and frequently at even less cost, on standard machines equipped with an attachment devised in the shop and fitted to the exact need of the operation.

Quality-control as a vital part of the production organism also comes in for its share of these new methods which render inspection operations more reliable, faster and less expensive. Mechanizing inspection is a fertile field. Considerable progress has been made recently in designing automatic inspection set-ups. Colored signal lights, which replace scales and marks on inspection apparatus are being adopted extensively, and the possibilities in this direction are indeed many. To illustrate some of the more interesting methods, a search was made through the shops of many representative manufacturers. Among the most instructive and striking examples found were the following.

Nut Driver Installation

CADILLAC has a mighty good set-up for removing connecting rod bolt nuts prior to assembly on the engine.

As shown in Fig. 1, the small stand with an electric drill attached comprises the apparatus. The electric

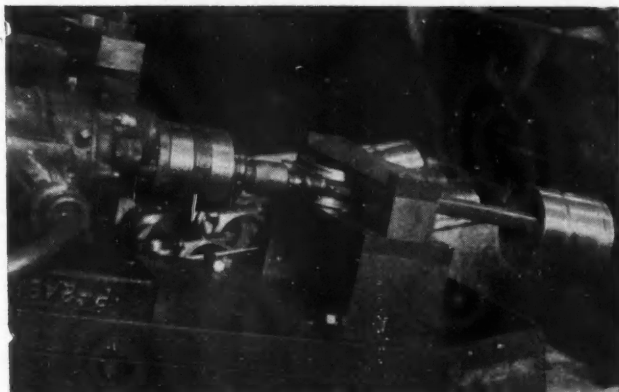


Fig. 1—Electric drill unit for removing connection rod bolt nuts

drill with nut driving attachment is rigidly fixed. In proper relation with the socket end of the nut driver is a slide just a little larger than the thickness of the big end of the connecting rod. When in use, the electric drill runs continually. The operator inserts the big end of the rod into the slide, engages the nut, pulls out the rod, reverses it and removes the other nut. The process is extremely rapid because the slide guides the rod, keeps it from turning, and automatically lines it up with the nut driver.

This is particularly interesting because of its adaptability to many other similar operations.

Valve Spring Test Set-Up

VALVE springs may be checked rapidly and accurately by means of the excellent arrangement devised by Graham-Paige (Fig. 2).

Usually the operator places the spring under the press and notes the reading on the scale. Now with the new arrangement shown here, the operator gets all the information from automatic indicator lamps located in the signal box at the right of the plunger. Green light shows correct weight—red light, too heavy—no light, too weak. Light contacts are made on the adjustable sector by means of the arm carried on a shaft extending through the glass of the scale.

This set-up may be used for any kind of coil spring. It points the way to better quality and high output without adding to cost.

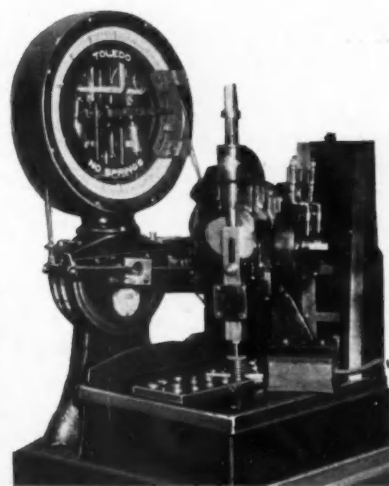


Fig. 2—Graham - Paige uses an automatic scale to check valve springs

Ring Gear Inspection

ASILENT rear axle is of prime importance to fine car performance. It is essential therefore to have a positive control over every factor and every part that can affect quietness. The most important unit here is the gearset. For true quietness, gears must be accu-

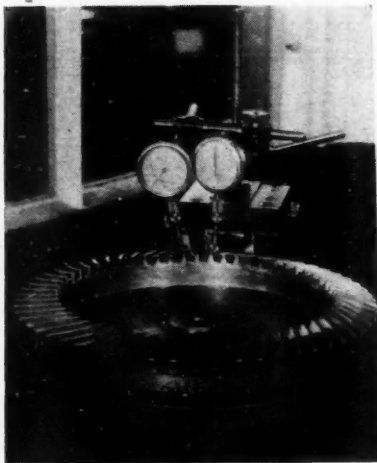


Fig. 3—Device used to check teeth in ring gear

rately generated and lapped to maintain correct tooth form and pitch diameter within required limits. (Rear axle gears are not ground.)

For the final inspection of the ring gear, Cadillac has designed the fixture shown in Fig. 3. Observe the two indicators which multiply the movement of the fingers at the plate. One set of fingers is adjusted to check tooth spacing; the other to

check tooth thickness at the pitch line. The gear is right when it passes this inspection and is ready for assembly. What makes this fixture so interesting is the fact that it is foolproof, positive in action and does not rely upon the judgment of the inspector.

After the careful inspection of the ring gear and pinion for mechanical errors the gearset is run at varying speeds in an inclosed room (free from noise) where with the assistance of instruments and the trained ear of the inspector noisy gearsets are rejected.

Splitting Rod Bearing Caps

AN automobile company is splitting connecting rod bearing caps and milling the bolt bosses in a single operation at the rate of 60 to 65 pieces per hr. by means of the equipment shown in Fig. 6. A Mil-Waukee-Mil Simplex with a two-spindle, double-decker head is fitted with a hand-indexing fixture holding four rods—two on each side.

The fixture is mounted directly on the index base and two pieces are always in the cut while the operator is loading the other side. The two cutter spindles, one above the other, are $6\frac{7}{8}$ in. apart and as the work feeds into the cut the top and bottom bolt bosses are milled simultaneously with the splitting of the caps.

To secure accurate alignment in this operation the wrist pin holes and crankshaft bore are accurately faced.

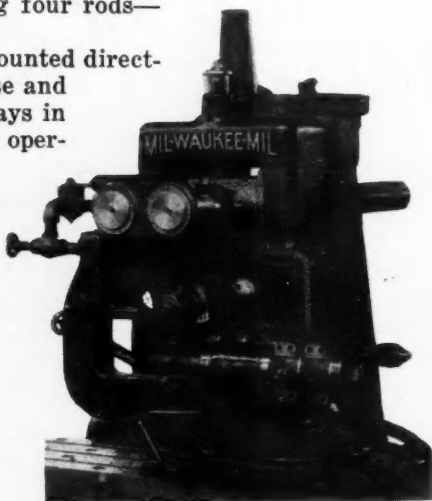
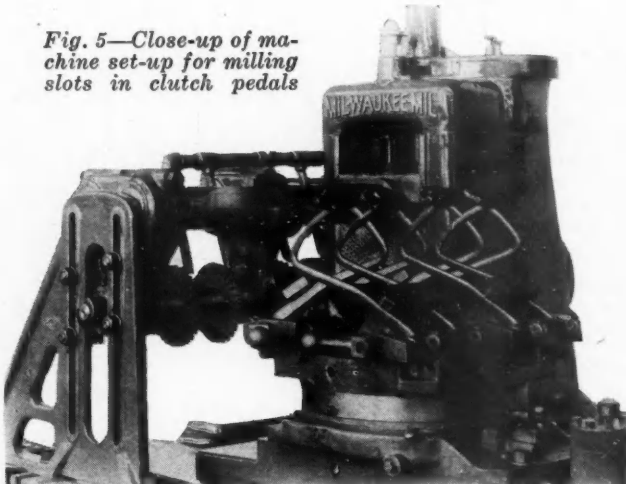


Fig. 6—Equipment used for splitting bearing caps and milling bolt bosses

Milling Clutch Pedals

MILLING 7/16 in. slots in clutch pedals $1\frac{1}{8}$ in. deep is being performed at the rate of 360 pieces per

Fig. 5—Close-up of machine set-up for milling slots in clutch pedals



hr. by one manufacturer by use of the equipment shown in Fig. 5. A No. 1404 Mil-Waukee-Mil Simplex with automatic reciprocating table and a special indexing fixture for holding eight pieces is employed.

The pedals are mounted on studs and held in position in sets of four by heavy clamps. By reducing travel to the cutters and feeding straight into the slot, production has been speeded up five times over the former method. A cam control device speeds up the return to the indexing point and, since four pedals may be loaded while another four are being milled, production is practically continuous.

Painting Window Reveals

FINISHING the window reveals is a job that requires considerable preparatory work largely due to the necessity of masking adjacent painted surfaces. A common method is to cover finished surfaces with paper as is shown in Fig. 4. Naturally, this requires great care and much time. Now Durant points the way to

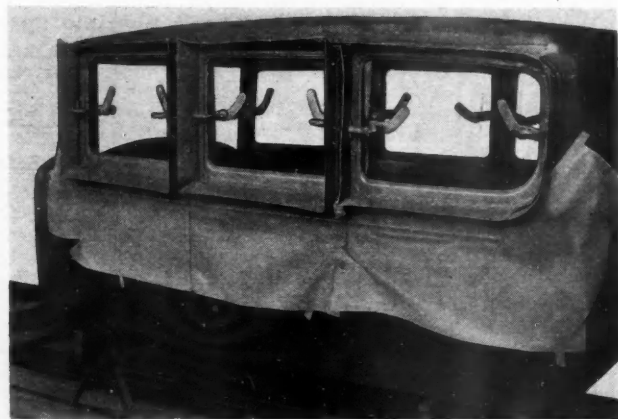


Fig. 4—Quick action screens clamped to body while painting reveals

putting this kind of work on a production basis. There have been designed the frames shown here which are attachable by means of quick-acting clamps. This eliminates practically all set-up time.

Machining Fan Pulleys

CHRYSLER CORP. is using a number of machines similar to the one shown in the accompanying

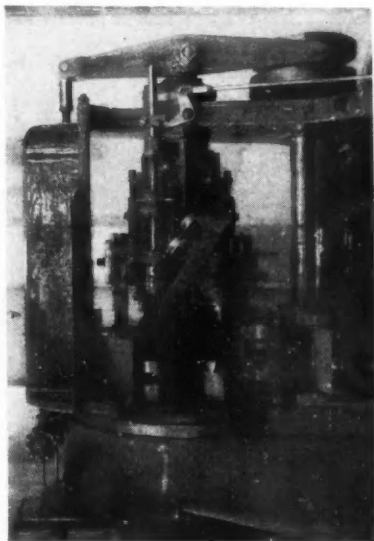


Fig. 7—Baird six-spindle horizontal chucking machine set up on a Chrysler fan pulley, which is finished in one operation

illustration (Fig. 7) for machining various fan and generator pulleys. The machine shown is a Baird six-spindle horizontal chucking machine by means of which individual speeds can be obtained for each spindle to fit the work to be performed.

The pulley shown is cast with a long hub by which the piece is held in the chuck while the last operation in the machine cuts the hub off. This operation also finishes the inside end of the hub and the pulley drops

into a magazine below the machine, giving the operator time to remove the piece of hub from the chuck and to insert a new unfinished piece.

An advantage of this equipment for this job is the possibility of using a generated motion in machining the V-groove of the pulley. Several tools are used, one advancing from each side at an angle while another tool in the center of the machine cuts the bottom of the Vee. The floor to floor time for pulleys finished on this type of machine varies from 30 to 54 sec., depending upon the size of the pieces.

Economical Grinding

A REDUCTION in the piece rate for the operation from \$2 to 40 cents per hundred was obtained in a well-known parts plant by the installation of the equipment shown in Fig. 8 for grinding the outside diameter of clutch sleeves. About 0.015 in. stock is removed from the diametrical dimension is one grind. The O.D. must be held square with a previously finished flange face and concentric with the bore. The



Fig. 8—Grinding outside diameter of clutch sleeves on an installation equipped with a combination expanding center, and capable of turning out 200 pieces per hour

tolerance on the diameter is 0.001 in. and for squareness 0.002 in.

The machine used is an automatic cylindrical grinding machine built by Arter Grinding Machine Co., Worcester, Mass., equipped with a combination expanding center. The machine indexes four times per min. to give an output of about 200 pieces per hr. The wheel is dressed every 100-125 pieces.

Equalizing Four Wheel Brakes

THE method used by Pierce-Arrow for making the final brake adjustment is shown in Fig. 9.

The car is driven up on the Cowdrey machine. The brake pedal is depressed 2½ in. and held in place by a spacer placed between the pedal lever and the floor

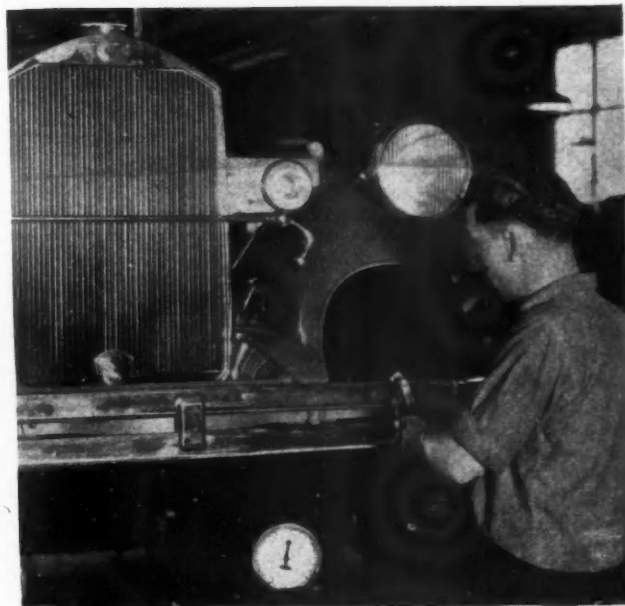


Fig. 9—Gages are used in the Pierce-Arrow plant to check final brake adjustment

board. Brake rods are then taken up one by one so that each wheel has a resistance of 400 lb. indicated by individual gages. Then the brake pedal is released and readings of the gages noted to see that no more drag is registered than the normal resistance of bearings and washers.

This method has given uniformly satisfactory results.

Twist Drill Standards

THE technical committee on standardization of twist drill sizes, a sub-group of the American Standards Association's sectional committee on small tools and machine tool elements, has conducted an intensive study of the 138 drill sizes carried in stock by the various drill manufacturers and users in the size range from No. 80 (0.0135 in.) to ½ in. inclusive. As the result of this study the committee has prepared two proposals covering diameter and length, which are considered satisfactory for use by industry. The proposals are now being circulated for review among users of these drill sizes to determine which are preferred. Copies of the proposals may be borrowed through the A.S.A. office, 29 W. Thirty-ninth St., New York.



J. P. Stewart, Vacuum Oil Co., who presided at the meeting of the Pennsylvania Section, S.A.E., on Oct. 9

Tests and Specifications of Discussed from Angle

Subjects considered before the Penn those on research on laborat the purchaser's expect

By JOSEPH

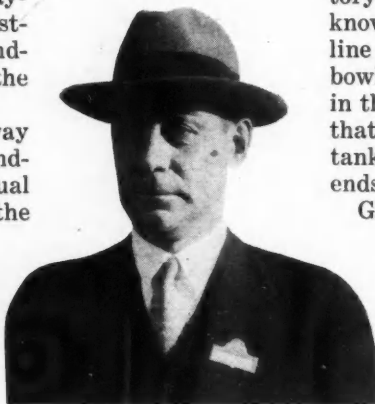
FUELS and lubricating oils for automotive vehicles, from the standpoint of both the refiner and the user, were discussed in four papers read before an impressive gathering of about 300 members and guests of the Pennsylvania Section of the Society of Automotive Engineers, at sessions held in the Hotel Winfield Scott, Elizabeth, N. J., on Oct. 9. J. P. Stewart of the Vacuum Oil Co., presided, while J. W. Saybolt of the Standard Oil Co., acted as toastmaster. C. G. Black, president of the Standard Oil Co. of New Jersey, welcomed the members in opening the dinner session.

The inspection trip through the Bayway refinery and by-products plant of the Standard Oil Co. of New Jersey was an unusual feature of this meeting. Naturally, the automotive research laboratories were nearest to the interest of the members and were the center of attraction. Here was seen the apparatus and set-up for the gum test, knock test; also the dynamometer rooms, and various other interesting equipment mentioned in the discussion.

"Laboratory Testing of Motor Oils and Fuels Under Summer and Winter Conditions," by Dr. A. E. Becker and W. C. Bauer of the Standard Oil Co. of New Jersey Development Corp., dealt with the problems of the oil refiner in producing fuels and lubricating oils suitable for low temperature operation.

The modern research laboratory of the Development Corp. was described, and later was inspected by the members in the course of a trip through the plant of the Standard Oil Co. of New Jersey. Here facilities were seen for testing engines, units and complete vehicles under controlled temperatures and simulating actual road conditions.

Winter oil must do everything that the summer oil does and yet must resist dilution, permit easy starting at zero and sub-zero temperatures, and be fluid enough to pump readily, the authors of the paper stated. That breakaway torque is not a factor in engine cranking at low temperature has been definitely established. However, with certain fuels, the low speed turning torque becomes excessive and objectionable. Moreover, they found that low pour is not necessarily a measure of easy starting nor the facility with which oil can be pumped. They have also demonstrated that pressure is not always an index of oil flow at low temperature.



Dr. A. E. Becker, Standard Oil Co. of N. J., who, with W. C. Bauer, delivered a paper on laboratory tests at the S.A.E. meeting

A winter gasoline must enable any car in any condition to start readily in cold weather. And because of the difficulty in simulating actual starting conditions in the laboratory, cold starting tests with the engine's own equipment are preferred. Interpretation of laboratory test results must be tempered by the knowledge that the composition of the gasoline in the vacuum tank or the carburetor bowl is not the same as that of the gasoline in the main tank. Recent starting tests show that gasoline in passing through the vacuum tank may lose 2 per cent of the total light ends.

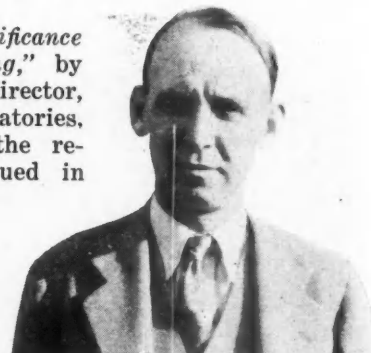
Gas lock occurs when the temperature of the gasoline in the carburetor bowl exceeds its liquid initial boiling point, rather than that of the fuel in the main tank, by 4 to 6 deg. Fahr. This can be overcome by designing the feed system so that the liquid initial boiling point of the fuel in the carburetor bowl is never reached.

Finally, it is shown that the proper choice of the carburetor, and carburetor settings checked by exhaust gas analysis, will result in real fuel economies.

During the discussion, in which several members took part, Dr. H. C. Dickinson, U. S. Bureau of Standards, said that tests conducted in his department are in general agreement with the conclusions in this paper.

"The Practical Significance of Fuel Knock Rating," by Earl Bartholomew, director, Ethyl Gasoline Laboratories, Detroit, dealt with the research methods pursued in developing a technique for correlating laboratory knock ratings with results under actual operating conditions.

Specifications covering the design and operation of a standard laboratory test engine are given,



W. C. Bauer, Standard Oil Co. of N. J., co-author with Dr. A. E. Becker, of a paper read before the Pennsylvania Section, S.A.E., last week

Fuels and *Lubricating Oils* of Users and Refiners

*sylvania Section, S.A.E., included
ory tests, gum in gasoline and
tation in standards*



J. W. Saybolt, Standard Oil Co. of N. J., who was toastmaster at the luncheon during the meeting of the Pennsylvania Section, S.A.E.

GESCHELIN

with the object in view of making this engine a standard measuring instrument. In physical dimensions, it may bear little or no relation to an automobile or airplane engine but, it will give, by proper choice of conditions, knock ratings representative of the ratings obtained in these engines under their average operating conditions.

The author summarizes the history of knock-measurement apparatus and arrives at the reason for the design of the standard laboratory engine as being primarily, that laboratory knock-ratings have failed to serve as a guide to actual performance.

A series of tests on laboratory engines, now in progress, warrant the following conclusions:

(a) Since no satisfactory means of measuring detonation in absolute units exists at present, the comparative anti-knock effectiveness of tetraethyl and benzol are not yet definitely established. Accordingly in cases of variation at different speeds, two fuels have been considered equal

when each is at the point of incipient detonation at some speed during acceleration up to 50 m.p.h.

(b) Two fuels equal in anti-knock value in one engine under a given set of conditions are not necessarily equal in an engine of different design under the same conditions.

(c) In view of this behavior, the ratings of fuels in automobile engines must necessarily represent a compromise.

(d) Despite variations in rating on different laboratory engines, they

all produce variations in the same direction as the result of a given set of conditions.

Among the specifications of the standard laboratory

engine are the following: (1) It should be a universal engine which by a change of conditions is suitable for testing fuels for any type of engine; (2) Cooling, regardless of the liquid used, should be by evaporation and the liquid should be circulated if high temperature cooling liquids are used; (3) Crankshaft, connecting rod and bearings should have ample strength to withstand for long periods of time the shock produced by detonation; (4) It should be as simple and cheap as possible consistent with durability, accuracy and reproducibility of ratings.

Engines used in the Ethyl Gasoline Co. laboratories have given reproducible anti-knock ratings within a variation of only about 3 per cent.

Dr. Dickinson was in agreement with other speakers in the discussion of this paper, that anti-knock ratings are still relatively unknown quantities.

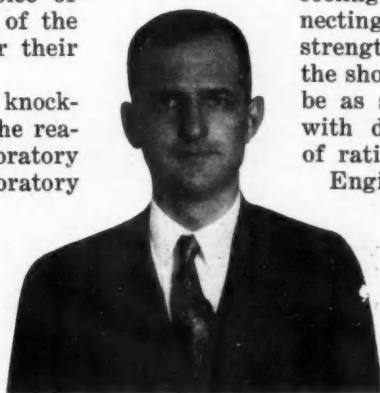
E. B. Neil, secretary, Pennsylvania Section, Society of Automotive Engineers, suggested in the general discussion that followed, that the advertising to the fleet owner as well

as the general public could be made more constructive and more useful to the reader.

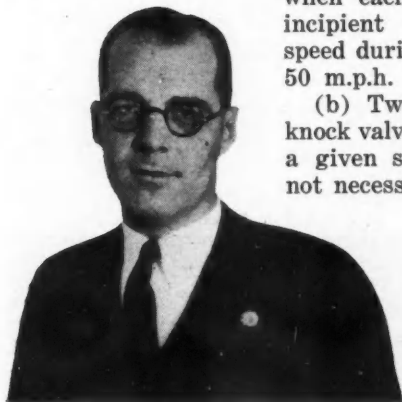
H. L. Brownback concurred in this and added the user should be told a good deal more about the fuels he buys.

"Gum in Gasoline," by E. B. Hunn, A. J. Blackwood and H. G. M. Fischer of the Standard Oil Co. of New Jersey Development Corp., was read by E. B. Hunn in opening the evening session after a dinner at the Hotel Winfield Scott. Cracked gasoline, now universally produced because of its high anti-knock qualities, has brought with it the problem of gum formation and the immediate necessity for controlling it.

Based upon many tests by the Development Corp. and other investigators, the following information about gum is now well established: (a) Cracked gasoline as it comes from the still is free from gum. Usually, however, it contains unstable hydrocarbons which form gum during storage. (b) Gum formation from these unstable constituents is essentially an oxidation process, as the fuel contains considerable combined oxygen. Also, it has been shown that gum will not be formed in the absence of oxygen. (c) Gum formed by oxidation during storage remains dissolved in the gasoline, and it is the amount of this dissolved gum that concerns engine operation. (d) Unstable constituents (potential



Earl Bartholomew, Ethyl Gasoline Laboratories, who read a paper on knock ratings at the Pennsylvania S.A.E. meeting



Adrian Hughes, Jr., United Railways and Electric Co. of Baltimore, who discussed the purchaser's ideas on fuel specifications



H. G. M. Fischer, Standard Oil Co. of N. J., who was a co-author of a paper on gum in gasoline with E. B. Hunn and A. J. Blackwood

gum) in the gasoline are not transformed perceptibly into gum deposits during the passage of the air fuel mixture through the manifold.

Repeated tests show that the "copper-dish-gum" is no index of the amount of gum deposited in the engine and it is recommended that this test be abandoned. "Porcelain-dish-gums" are also unreliable except for values which are the same

was plotted which suggests that a dissolved gum content of about 15 mg. gum per 100 cc. is permissible. However, further tests will be necessary to establish some reasonable and reliable value of the maximum permissible gum content.

The discussion disclosed that the only effect of gum is to deposit on intake valves and stems. Of course, excessive gum content will induce sticky valves, but



A. J. Blackwood, Standard Oil Co. of N. J., who was a co-author of a paper on gum in gasoline read before the Pennsylvania Section, S.A.E., last week

or nearly the same as for the dissolved gum.

Two gum tests have been developed which seem to agree closely with actual operating conditions. The first determines "dissolved" or "performed" gum by evaporating the gasoline under conditions such that no additional gum will be formed during the test. The technique developed by the authors was found to give reproducible results. The other test is the "accelerated oxidation test for stability," which measures the stability of gasoline by means of oxidation at elevated temperature. These tests are recommended as being worthy of standardization.

Three tests on a standard passenger car were made to evaluate the maximum permissible gum content consistent with satisfactory engine operation. Blended fuels containing 10 mg. gum, 25 mg. gum, and 50 mg. gum, respectively, were used. The first blend gave satisfactory performance throughout the 5000-mile run; the second resulted in perceptible loss of power after 3000 miles, without valve trouble; whereas the third blend, showed a marked loss in power and some valve trouble. From these data a curve



E. B. Hunn, who read a paper on gum in gasoline before the meeting of the Pennsylvania S.A.E. at Elizabeth, N. J. on Oct. 9

at present the maximum gum content is well within safe limits and the whole problem is merely one of control on the part of the refiner.

"Fuel Specifications From the Purchaser's Standpoint," by Adrian Hughes, Jr., superintendent of bus transportation, United Railways & Electric Co., Baltimore, closed the session with a frank recital of what the bus and truck fleet operator expects from fuels and lubricating oils. Fuel economy is the principal consideration, as measured in miles per gallon of fuel. Other requirements are power, accelerating ability and freedom from knocking.

Adequate and uniform cooling was offered as a solution to the fuel and lubricating problem. They have experimented with a special cooling system on four-cylinder engines which has given good results in economy and operating characteristics largely by providing high cylinder wall temperatures, uniformly maintained.

Economy in fuel on trucks and buses is considered so important that some work already has been done in adopting the Diesel engine and burning ordinary fuel oil.



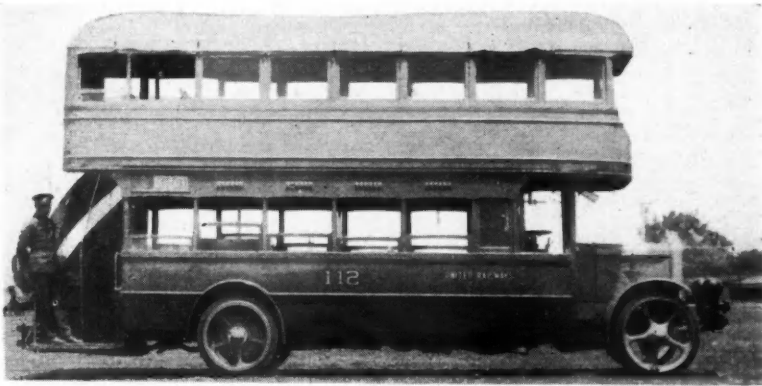
Members and guests of the Pennsylvania Section, S.A.E., photographed during the inspection trip of the Standard Oil Development Co.

Mr. Hughes then suggested the need for a uniform and reliable method of determining the fuel and oil best adapted to any given set of conditions on existing equipment. Another pressing need is for specifications defining fuels and oils in an understandable, reliable manner.

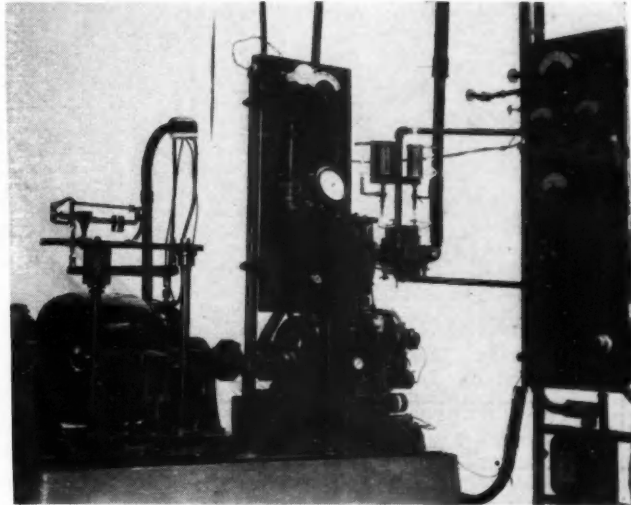
He cited the difficulty of selecting proper grades of fuel and oil from the present specifications and emphasized the fact that he found it necessary to make accurate tests himself to determine the suitability of the grades he specifies.

A number of interesting tests were described showing how his company studies vehicle operation and the related fuel problem. One of the double deck buses used in these tests is shown below. This is a four-cylinder job equipped with the special cooling system which is mentioned. Permeating the paper was the plea for understandable specifications that would show the fleet operator a way out of the present situation.

Dr. H. C. Dickinson, in the discussion that followed, agreed that fuel economy is of growing importance. Touching upon specifications he disclosed that the U. S. Bureau of Standards has been studying this for a long time and that they were striving for specifications which would represent at least a good compromise.



Type of bus used in fuel tests made by the United Railways & Electric Co. of Baltimore



Variable compression knock testing engine being developed by a joint committee of the A.P.I. and S.A.E.

A. C. Purdy also commented on the necessity for fuel economy in fleet operation. Sulphur, with its attendant corrosion, was another subject that he suggested as being worthy of immediate study.

High lights of the various papers were brought out in the closing discussion.

A. L. Beall suggested that gum in gasoline varied with the storage time and container size as these are factors in inducing changes from potential to actual gum.

J. C. Geniesse, Atlantic Refining Co., mentioned that his company was conducting research into the problems covered by the papers presented at this meeting and confirmed the conclusion that breakaway torque was not a factor in low temperature performance of lubricating oils.

The Standard Oil Co. staff contributed largely to the success of the meeting by its active interest in assisting the proceedings.

Technique of Purchase

THE U. S. Navy, we learn from a Supplement to the A.S.A. Bulletin, has developed a technique of purchase on the basis of a work factor. It does not purchase the lowest-priced product meeting minimum requirements, but that product above the specification requirements which gives the most service per dollar of cost. This involves the selection and measurement of the most important factors which enter into the service of goods. In the case of valve-grinding compounds this method was applied as follows:

Tests were made by the Bureau of Engineering on seven samples of valve grinding compound, the factor, pounds ground away per pound of valve grinding compound varied over the large range of 0.173 to 0.403. The best compound gave 2.3 times greater service, while costing only 17 per cent more than the poorest. The best removed a pound of metal in 17 hours while the poorest required 40 hours. It is noted that the time efficiency ratio and the material efficiency ratio are practically the same; that is, the labor cost with the poorest compound would be about 2.3 times that with the best.

The tests are made on a machine designed to simulate the work of grinding an engine poppet valve in its seat, the mode of rotating and lifting the test disks, the grinding pressure, and the rate of supply of the compound all being standardized. The work value is defined as:

$$\frac{\text{Weight of material ground away from valve} + \text{Weight of material ground away from seat}}{\text{Weight of compound used}}$$

Table of Valve Grinding Work Factors

Bidder	Grade	Cost Per Pound			
		A Bid Price Per Pound	B Work Factor	of Metal Removed Col. A/B	Average Fine and Coarse
G	Fine	\$0.2950	0.346	\$0.8526	\$0.7462
G	Coarse	0.2950	0.461	0.6399	
H	Fine	0.2650	0.177	1.4971	1.2871
H	Coarse	0.2650	0.246	1.0772	
I	Fine	0.2523	0.161	1.5670	1.4691
I	Coarse	0.2523	0.184	1.3712	

Just Among Ourselves

Necessity Will Force Change in Distribution Methods

WE predict that the next ten years will see twice as many actual changes in automobile factory distribution policies and methods as have occurred in the last ten. That doesn't mean that a great number of entirely new ideas will be injected into the picture—merely that economic conditions will force a far more widespread application of a good many principles and methods already shown by use to be sound.

A good proportion of these changes in actual operation, we think, will come in connection with dealer relationships and will come as a result of necessity. New dealers with capital are harder to get every year. Any distributor or factory wholesale man will tell you that. Consequently, the only chance of adequate representation in a given territory a factory is going to have often will be to get either:

(1.) A dealer so able that he can make a success even though starting with inadequate capital.

(2.) A means of helping and supervising a mediocre dealer so that he can function somewhere nearly as well as the able dealer could without supervision and detailed help.

* * *

Under Any Sales System Dealers Must Profit

THE day already has passed when the manufacturer can or does consider the dealer as a customer for his automobiles; the public now is generally recognized as the only real customer. And yet the day when the dealer was considered the customer by some factories didn't pass entirely as many years ago as some would like to have us believe. The day is coming when no factory will

ship cars to a dealer incapable of selling them merely because analysis proves that a good dealer could sell the given number in that territory. Either the manufacturer will dig in and show that dealer how to sell the number determined upon, or cancel the dealer and get a good one if such is available, or rest content with shipping only in such volume as the given dealer can sell. This practice is already in vogue by at least one very successful manufacturer and will be used by many more as time goes on. The absorption capacity of any given territory is being recognized as being—not a theoretical economic capacity—but a combination of the buying power of the community, the opinion of that community about the given automobile, and the ability of the dealer merchandising the automobile in the community.

The factory of the future will not be content even occasionally to rest with proving why it is a dealer's own fault that he doesn't make money—selfishly the factory will see to it that he does. Either that must be done in the case of a vast majority of dealers or some entirely new dealerless means of automobile distribution must be found—and the latter possibility doesn't seem likely at the present writing.

* * *

Cash Price of Used Car Can Be Basis for Trade-in

HEARD a dealer the other day propound a new idea about how to approach a prospect as regards his used car. The dealer said the best thing is to start your conversation with a prospect by asking him how much he will take in cash for his used car. The figure named is usually a good bit lower than he expects on a trade, this dealer claims. Then he has that as a basis for trading negotiations later on in the

deal. If this particular dealer weren't successful we wouldn't have quoted his thoughts on this matter, because they seem unsound to us for a number of reasons. Nevertheless, it was a new idea to us.

* * *

Add to List of "Service Experiences":

PENNSYLVANIA has compulsory automobile equipment inspection now. Mr. Jones, Blank car owner, enters Blank dealer service station to get his car officially inspected. He approaches information clerk at desk in service office. Asks for service manager, who happens to be out. Then:

Mr. J.: "I have my Blank car out here and would like it inspected."

Clerk: "Sorry, but we are out of official stickers. Should have some in by tomorrow."

Mr. J.: "Couldn't you inspect my car and then send me the sticker when it comes in?"

Clerk: "Well, I suppose we might. You'd have to come back again anyhow; have to leave it overnight for inspection."

Mr. J.: "Overnight? Can't I have it done now?"

Clerk (still remaining seated and casually interested): "No. Better bring it back tomorrow about noon."

Mr. J.: "But that isn't convenient for me. This is an inconvenient place to get to; takes me about forty minutes round trip through traffic. I may not be able to get in for a week or so."

Clerk (looks up helplessly): "Sorry."

Mr. J.: "Take your inspection and go to hell."

And he took his car to a competitive dealer, one of whose cars Mr. Jones also owned, had it inspected in fifteen minutes. —N.G.S.

Safety Devices for Machine Tools Vital to Industrial Progress

Guarding the worker in the shop has proven profitable not only from the humanitarian viewpoint, but in actual dollars earned, National Safety Congress hears.

By M. WARREN BAKER

THE increasing tendency toward full automatic machine tools and the adoption of tungsten carbide were outstanding features described in the Production and Equipment issue of *Automotive Industries* last week. The great interest in the Machine Tool Congress and Exposition in Cleveland, which formed the subject matter of considerable discussion in that issue, made it necessary to submerge, temporarily, a decidedly important phase of industrial interest which was under consideration in Chicago during the same week—that of the safety of the worker at these machines.

Accident prevention in industry is largely a management problem, and the best managed companies, industries or groups of industries have the fewest accidents. This is the impression gained by the observer at the close of the eighteenth annual National Safety Congress, held in Chicago under the auspices of the National Safety Council just prior to the Machine Tool Show.

It seemed quite generally conceded that safety pays, not solely in the popularly accepted sense that no money can replace a human life, but also in the actual dollars and cents saved and therefore earned.

The great strides made in the use of safety devices for modern machine tools during the past years were described by Luther D. Burlingame, of the Brown & Sharpe Manufacturing Co., Providence, R. I., in his address to the Congress on the "Seven Seals of Safety."

"Looking back to the days when machine tools were built without guards and without any provisions for safety," he said, "days when the dangers were taken for granted and the workman was expected to look out for himself, we see the first seal broken when partial and limited guards were applied to protect from gears, belts and other moving parts. The second seal was broken when makers supplied the complete guards with the machines as placed on the market. The third, when through a re-designing of the machines, gears and danger points were placed inside the machine out of reach and where no guarding was necessary. The fourth, when mechanical controls for shifting belts, operating chucks, changing feeds, etc., became the stand-

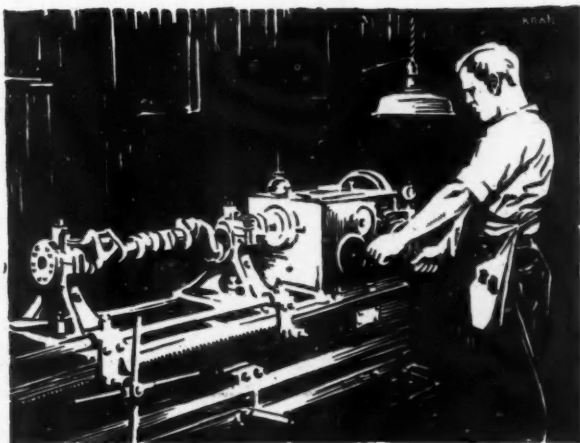
ard practice; the fifth when individual motor drives largely replaced the use of exposed belts and eliminated other features of danger. The sixth, giving attention to the location and lighting of machines and proper instruction in their use, including also matters of clothing, goggles, etc. The breaking of this sixth seal for safety is still in progress, as is the breaking of the seventh, giving protection at the cutting point, the most dangerous as well as the most difficult of all to guard."

"The seventh seal, which, when broken, will still further lead the way to safety, is in guarding the cutting point, which has already been named as the point of greatest danger, and that most difficult to guard. At a machine tool factory, with over 6000 employees, while less than one-fourth of the cost of compensation for accidents was for cases involving machinery, more than three-fourths of the cost which did come in this classification was for accidents occurring at the point of cuttings, showing the importance of finding means for breaking this seventh seal obstructing the way to safety," Mr. Burlingame concluded.

Safety in welded construction depends entirely on procedure control, according to H. Sidney Smith, Union Carbide and Carbon Corp., New York, who said in part:

"While injuries to workmen or others have been few and far between, there is one point that deserves special consideration at this time and that is fires resulting from failure to take proper precautions in using oxy-acetylene equipment. In every case that has been brought to my attention these have been preventable.

"It is realized that oxy-acetylene equipment is frequently used, particularly in repair and maintenance, under conditions which are far from ideal. Use of welding or cutting apparatus under such conditions demands that those in charge make certain that every possible precaution has been taken to meet any emergency that might develop. Most important to guard against are the



sparks and drops of hot slag produced during the cutting operation.

"It seems hardly necessary to point out that welding and cutting should never be done in any locality where the use of open flames is prohibited or dangerous. Repairs on tanks, drums and containers of all types that may have been used for inflammable liquids come under this same heading.

"Developments during recent years have focused attention on another phase of safety in the welding industry and that is the safe application of welding in the fabrications of products and structures where the strength of the structure is dependent upon the strength of the weld and where failure might result in injury, loss of life and property damage."

"It is well to remember that even today there are certain welding applications that should not be attempted. Never weld links in chains or chain hooks. Under no circumstances should automobile steering knuckles be welded. Indiscriminate repairs to boilers should not be sanctioned. The welding of flywheels should be restricted to those who have been properly instructed in such work."

Training of Employees

Several points in the training of employees to insure safer working conditions, were stressed by Walter J. McCarter, Cleveland Railway Co. Among these were:

"Training, to become effective, must be applied specifically to the individual in such a way that it will be a corrective treatment of his deficiencies, whether these be fundamental in nature, or merely improper performance.

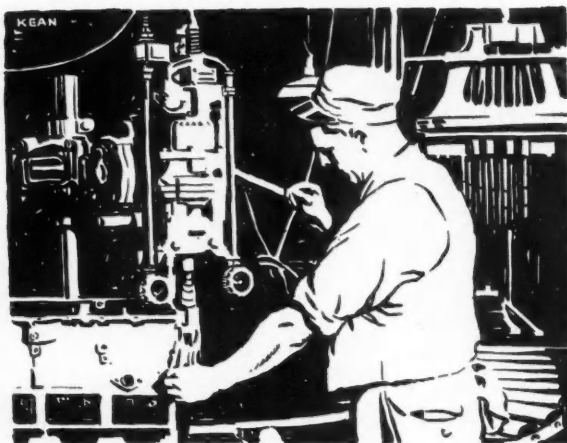
"When tests are used in selecting men of the proper aptitudes to avoid accidents, the field from which selection is to be made must be enlarged in many cases if the proper standards are to be maintained. The problem of employment, then, is more than just the ability to select people with proper aptitudes.

"Past experience with selective tests has shown that, although men with proper aptitudes will give better results than the unselected, adequate results cannot be obtained unless this is followed by proper training based upon the individual differences and definite abilities as disclosed by the selective tests.

"The results of our experimentation prove the soundness of making research of the individuals who are accident-prone. It demonstrates that accident prevention is a matter of training, and that educational activities should supplement it."

The point at which education should start was outlined by Ray H. Sullivan, Fisher Body Corporation, Detroit.

"Coincident with the development of modern industry many movements arose which were designed to increase efficiency and care for changing conditions," said Mr. Sullivan. "Some of these movements were developed in certain plants after close study, and very effectively



applied in those plants. Efforts to apply them in other plants, however, were not so successful.

"Certain industrial leaders applied movements, the basic idea of which was that necessary job knowledge could be divided among several supervisors who might become expert on a smaller part of a job and thus simplify the problem. Movements of this nature would follow quite naturally after the success which followed the division of productive labor. When applied to jobs involving

supervision and direction they were not so successful in some plants.

Industrial Problems Differ

"Perhaps the very fact that industrial problems differ in various plants helps to confuse attempts to apply movements to some plants which have been successful in others. One result of the confusion which sometimes followed attempts to apply these new movements was to cause industrialists generally to analyze carefully before rushing into any movement.

"During the early experiments with functional management, it was believed that by a division of supervising responsibility the amount of education necessary could be made small enough to permit one person to absorb it quickly. It was intended that he should spread his specialized knowledge and supervision over a number of workers. Industry was realizing that the amount of education necessary for the industrial worker and supervisor was becoming very great. Industrialists were groping to find a means which would enable them to keep pace with the times and not slow up industry. It was still possible for the industrial worker, however, to become sufficiently educated, as part of his training, to enable him to work reasonably safe. The time element in training labor, even at this stage, was considerable.

Hazards Have Multiplied

"The mass production stage, however, changed conditions very rapidly. In our modern industrial plants the division of labor is so fine as to require very little training time. It is obviously impossible to expect the industrial worker in a short time to acquire much knowledge of the hazards that exist in his occupation, or the measures necessary to insure his working safely. Installation of mechanical conveyors and devices has introduced the need for the worker to know more to work safely. At the same time the development of industry multiplied the hazards involved, the division of labor reduced the training time during which the worker might learn them."

Other speakers on the program included Paul G. Hoffman, vice-president of the Studebaker Corp.; J. C. Thirwall, General Electric Co., and R. A. Shaw of the Murray Corp. of America.



Stutz Offers Chateau Series With Weymann Bodies

Flexible body construction and design are announced in conjunction with introduction of European coach builder's name to the automobile industry in America.

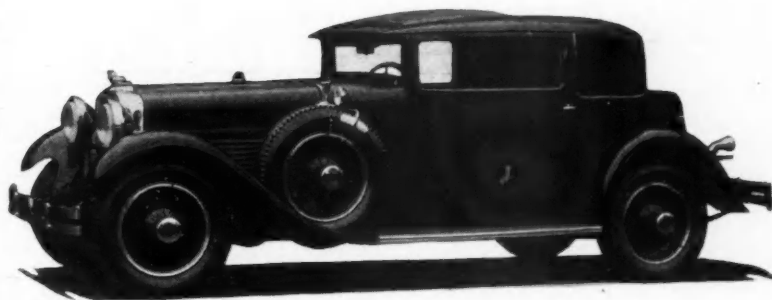
A NEW idea in custom bodies is presented by the Stutz Motor Car Co. with their offering of the new Chateau line of Weymann flexible bodies. Instead of designing these cars in the American mode, expert coach builders have been brought from Europe to duplicate in detail famous models owned by foreign nobility.

Among those celebrities whose cars are being copied on Stutz chassis are the Prince of Wales, the Duke of York and Lord Louis Mountbatten. Probably the most attractive of the new Chateau Weymanns is the model known as the Monte Carlo Coupe, which won first place honors for beauty at the International Concours d'Elegance at Monte Carlo.

Many innovations new to Americans will be found in these Stutz-Weymanns. The body frame is entirely flexible, being constructed by hand of light but very tough ash framing. Every joint is formed by a steel pivot that allows perfectly free movement and weaving of the various body parts. Instead of the usual metal covering, Weymann bodies are inclosed with a weatherproof and long-wearing fabric material that requires no painting and cannot be dented.

Advantages of this European type of flexible body are absolute silence, extreme durability, increased operating economy, speed and performance because of light weight, ease of cleaning and repairing, and individuality in luxury and appearance.

The factor of safety is enhanced by Weymann

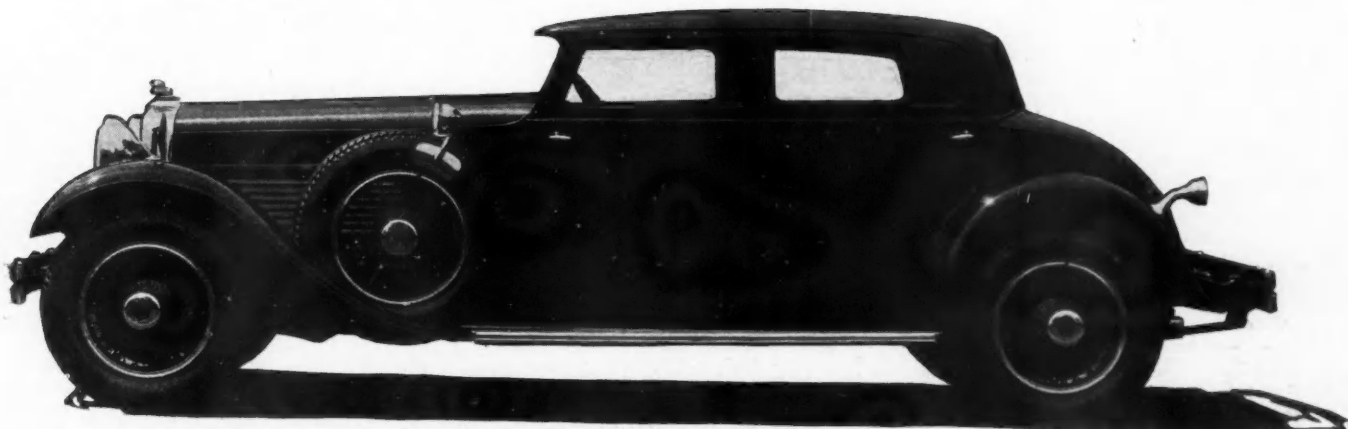


The Stutz-Weymann Longchamps with sliding roof, which is of Continental and English origin

bodies, because they are not so top-heavy as a metal body and therefore are more difficult to overturn at high speeds.

Among the foreign innovations found in the Chateau line of Stutz Weymanns are the Pytchley sliding roof on the Longchamps styles, extension rear curtain cord, permitting operation by the driver, and thick sponge rubber padding under the carpet to give an extremely luxurious sensation underfoot.

The following models comprise the Chateau line of Stutz-Weymanns: the Versailles, five-passenger four-door sedan on 134½-in. wheelbase; the Longchamps close-coupled two-door sedan for four people, also on the 134½-in. chassis. The longer 145-in. jobs include a five-passenger sedan, known as the Chaumont, and the Monte Carlo, a close coupled four-door coupe. Prices at the factory range from \$3,945 to \$4,495 list.



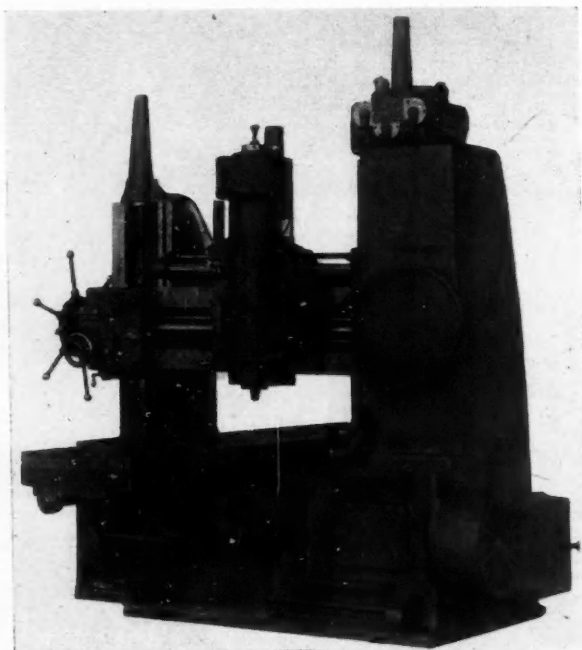
Stutz-Weymann Monte Carlo coupe, a replica of the winning body in the International Concours d'Elegance. Note that the doors are carried down close to the running board

NEW DEVELOPMENTS—Automotive

Milwaukee Bridge-Type Vertical Milling Machine

THIS new machine of the Kearney & Trecker Corp., Milwaukee, Wis., is adapted for face-milling, die-sinking, routing, profile-milling, and jig and fixture work. The bridge or rail can be raised or lowered by power at the rate of 25 in. per minute, and after the vertical adjustment has been made it can be rigidly locked in place.

The saddle carrying the vertical ram and spindle can be traversed a distance of 24 in. across the table by power feed or by power rapid traverse. The spindle ram has 7 in. of power down-feed, and can also be run



Milwaukee bridge-type miller

up or down with either slow or fast hand movement, the slow movement being graduated in thousandths. Four-position micrometer stops for the vertical ram movement can be furnished at extra cost, and the machine illustrated has these stops.

This new machine is built on any standard 2200 series Simplex bed, with a table 22 in. wide, and can be furnished in any length of table feed from 3 to 11 ft. The maximum width of work that will pass through the housings is 46 in.

The bridge is fitted to an upright housing similar to the corresponding part of the Mil-Waukee-Mil vertical, but much heavier in construction. The heavy upright housing is bolted solidly to the bed, and the bridge fits into ways on it. A secondary upright housing bolted to the front of the Simplex bed carries the front end of the bridge. The bridge is raised and lowered by means of two screws, one at each end, which are geared together to maintain the alignment.

The saddle which carries the vertical spindle ram has 24 in. of horizontal travel along the bridge or rail. This movement can be either at the feeding rate or power rapid traverse, depending on the location of the lower short lever at the front of the bed. Engagement of the feed or power rapid traverse is by means of the vertical lever at the front of the feed box on the outer end of the bridge. Release the thumb screw and move this lever to the right, the saddle will travel to the right; move the lever to the left past the vertical neutral position and the saddle will travel to the left.

The feed may be either with pick-off gears or a quick-change gear box, and with a range of either $\frac{1}{2}$ to 20 in. per minute or 1 to 40 in. per minute. The machine will be furnished regularly with a range of 1 to 40 in. per minute.

The spindle ram is fitted to vertical ways on the saddle, which, in turn, is fitted to horizontal ways on the bridge. The horizontal lever that extends across in front of the ram is for locking the gib in the saddle after vertical adjustment of the ram has been completed.

The spindle drive is through the standard speed box at the top of the main upright, and may be either through pick-off gears or a quick-change gear box.

All bridge-type Mil-Waukee-Mils are equipped with a stationary screw and revolving nut. This construction makes it possible to secure hand crank adjustment of the table without leaving the operating position and walking out to the ends of the table screw—a very convenient feature for set-up work. An interlock device with a crank and handle on the same cover plate makes it impossible to engage the power feed when the crank is set in the upper position for hand adjustment to the table. The lower position for the crank, as in the photograph, shows the interlock set for power table feed.

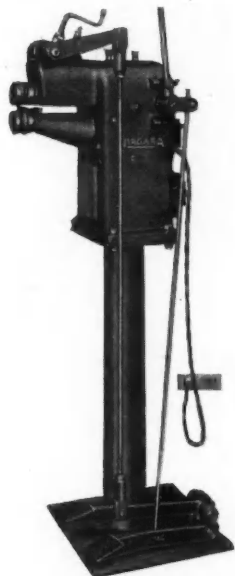
The bridge can be securely locked to both uprights. The saddle can be locked to the bridge and, as a further facility for accurate boring, a lock has been provided for the milling machine table. Thus, during boring operations the only movable part is the spindle. Anti-friction bearings are used on the spindle and throughout its drive.

The bridge type vertical is automatically lubricated. The spindle and its driving mechanism, the saddle and the feed box carried on the bridge—are all supplied with oil from the primary oil pump carried in the bed.

Niagara Electric Combination

ASHEET metal working unit, known as the No. 172 Niagara Electric Combination Machine, is offered by the Niagara Machine & Tool Works of Buffalo, N. Y. The machine, which is equipped with a built-in $\frac{1}{4}$ -hp. motor, operated from an ordinary lighting socket, will handle up to 18 gage metal. The design of the frame includes rigid housing of the motor and all gear and clutch parts. The clutch is of special design and is instantly controllable by a hand lever or foot treadle. The

Parts, Accessories and Production Tools



Niagara Electric Combination

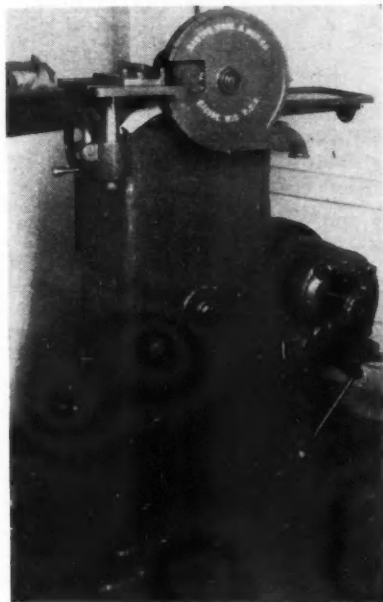
drive and intermediate shafts are mounted on roller bearings, and the roll shafts have bronze bushings.

The machine is mounted on a steel pedestal, with two treadles for convenience of operation of the clutch or upper shaft motion. This upper shaft motion can be controlled by either the foot treadle or a crankscrew or a combination of both. Lateral adjustment of the upper shaft is accomplished through two knurled screws.

Standard rolls for burring, turning, wiring, beading, crimping and slitting are carried in stock, with suitable gages for each operation. Flanging, elbow edging and special rolls for other sheet metal operations are made to specifications.

Abrasive Cutting Machine

THE Model 18 Abrasive and Friction Cutting Machine was shown by the Racine Tool & Machine Co., Racine, Wis.



Racine abrasive cutter

This is a high-speed abrasive disk machine particularly adapted to salvage work in cutting high-speed steels. It can also be arranged to cut tubing, sheets and structural forms by changing the table and using the proper disk.

All sliding parts and bearings are completely covered and protected from dust and chips. The machine is equipped with a sliding head and a quick-acting cam-operated vise.

The abrasive disk is 12-in. diameter x 3/32 in. thick. Maximum capacity is 2 1/2 in. x 2 1/2 in. The drive is by means of a V-belt either from the line shaft or individual motor. The spindle speed is 5000 r.p.m.

Super-Service Radial Drill

A NEW Super-Service radial drill is the latest product of The Cincinnati Bickford Tool Co., Cincinnati, Ohio. This machine is provided with an

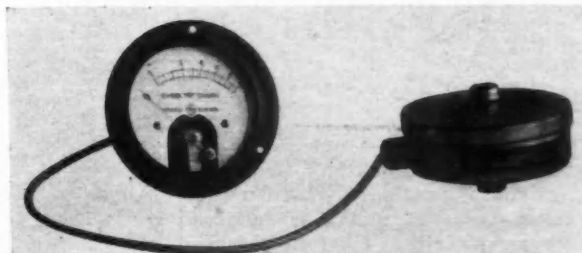
11 in. diameter column for rigidity, centralized controls and automatic lubrication.

For flexibility of operation, this machine provides 24 speed changes and 18 feed changes. All speed changes are effected at the head through selective sliding gears. This machine is completely wired and designed for integral motor mounting.

Electric Type Gasoline Gage

A NEW gasoline gage for aircraft announced by the General Electric Co. is electrically operated and is claimed to give accurate readings under practically every condition of normal flight. It depends for its operation on the hydrostatic head (pressure) of the gasoline to be measured and has no moving parts except the needle of the indicating instrument and the switch.

The new gage is essentially an electrically-operated, remote-indicating pressure balance, the electrical energy being supplied by the storage battery, dry-cell battery, or electric generator with which the aircraft is equipped. A complete installation consists of one or more pressure balance units, a remote indicating instrument (actually a milliammeter calibrated in gallons) having as many scales as there are separate tanks to be measured, and a normally open, hand-operated tumbler switch for each pressure balance. Every tank to be measured inde-



General Electric gasoline gage

pendently of the remainder of the gasoline supply requires a separate pressure balance, but where only the total contents of a multi-tank ship are to be measured, one pressure balance alone will serve the purpose.

An important part of each installation is the normally-open tumbler switch. This device insures a dead circuit at all times except when the pilot wishes to read his gasoline supply, thereby preventing unnecessary consumption of electric energy and overcoming any chance of fire from broken wiring.

Each pressure balance weighs approximately 2 lb., a single indicating instrument weighs 5 1/2 oz., a tumbler switch weighs 1 oz. and the twin conductor wiring weighs about 0.32 oz. per foot.

THE government of Rumania contemplates a drastic increase in the tariff duty on automobiles. The duty on vehicles the value of which does not exceed 150,000 lei is to be 12 per cent ad valorem. This does not seem excessively high but the situation is aggravated by the fact that the turnover tax is to be increased from 2 to 10 per cent and the luxury tax from 10 to 15 per cent.

News of the Industry

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VOLUME 61

Philadelphia, Saturday, October 19, 1929

NUMBER 16

Continued Recession Seen As Seasonal Curtailment

PHILADELPHIA, Oct. 17—Automobile production during the past several days, taking the industry in the United States and Canada as a whole, has revealed the continuation of the recession normal at this time of the year. It appears doubtful at present that the total output for October will be equal to the total of 417,035 vehicles produced in September or the total of 415,820 turned out in October, 1928. Activity of the factories during the last half of this month, however, may bring the total to a figure closely approaching 400,000 for October.

In view of the tremendous exports during the first nine months of the year, decided curtailment during the final quarter is to be expected. The prediction of an output of 5,600,000 vehicles during 1929, made last week by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, presupposes a total for the last three months of 739,965, an average of a little less than 267,000 units for each of the months of October, November and December.

To all present appearances, curtailment is to come gradually. There are no available indications of sudden and precipitous descent, and it is believed in some quarters that the total for the year will come closer to 6,000,000 than to 5,500,000.

Despite whatever modest performance is to be revealed for the final quarter of this year, nothing can detract from the startling record thus far established. The 5,000,000 mark within one year has been turned from a dream of far-visioned men into an accomplished fact.

Advertisers Name Officers

NEW YORK, Oct. 16—Association of National Advertisers at its meeting in Swampscott, Mass., this week elected Bernard Lichtenberg, of Alexander Hamilton Institute, as president. Guy Smith, of Libby, McNeil & Libby, retiring president, automatically became a member of the board of directors. New directors were elected as follows: P. J. Kelley, B. F. Goodrich Co.; H. C. Grimsley, Indian Refining Co.; Allan Brown, Bakelite Corp.; Stuart Peabody, Borden Farm Products Co.; Arthur H. Ogle, Bauer & Black; Allyn B. McIntire, Pepperell Mfg. Co., and Gates Ferguson, International Telephone & Telegraph Co.



R. McTammany

formerly sales manager of the central district of the B. F. Goodrich Rubber Co., who has been named to succeed L. A. McQueen, retired, as sales manager. He has been with the Akron concern for 24 years

Ford Will Train Serbs

CHICAGO, Oct. 17—Henry Ford has authorized Archbishop Dobrecic, primate of Serbia, to send each year to Detroit, for the next three years, 12 men who are to be taught to operate and manage an automobile factory in Montenegro which Mr. Ford proposes to establish after further negotiations with the Archbishop and the government of Yugoslavia, according to the prelate.

Rickenbacker Heads A.A.A. Contest Board

President Names War Ace to
Post for Fourth Term
as Chief of Races

WASHINGTON, Oct. 17—Capt. Eddie Rickenbacker, war ace and racing authority, will continue as chairman of the Contest Board of the American Automobile Association and will immediately develop a comprehensive program for the future of official racing, according to an announcement today by Thomas P. Henry, president of the A.A.A.

Mr. Henry pointed to the splendid accomplishments during the past three years under the leadership of Capt. Rickenbacker and said that great strides have been made in stabilizing racing, as well as authenticating stock car records and competition in the automotive field.

Members of the contest board will be: David Beecroft, New York, vice-president of Bendix Corp.; George H. Fearons, New York, the Automobile Club of America; Ray W. Sherman, New York, editor of Motor; Norman Shidle, Philadelphia, directing editor of Chilton Class Journal Co.; Coleman Roberts, Greensboro, N. C., president, Carolina Motor Club; W. D. Edenburn, Detroit, automotive and motor boat racing authority; Col. William G. Wall, Indianapolis, consulting engineer; T. E. Myers, Indianapolis, general manager, Indianapolis Speedway; Thomas J. Little, Indianapolis, chief engineer, Marmon Motor Co.; Earl Cooper, Auburn, Ind., retired driver (national champion 1913, 1915, 1917); E. Waldo Stein, Akron, Ohio, Firestone Rubber Co.; Robert B. Gable, Altoona, Pa., sportsman and capitalist; Arthur C. Pillsbury, Los Angeles, construction engineer.

Mr. Henry said that Val Haresnape, one of the best-known authorities on racing, from a technical as well as a sports standpoint, will continue as executive secretary of the board.

Outline Safety Requirements

NEW YORK, Oct. 17—A meeting of the A.S.M.E. Sectional Committee of Safety Codes for Mechanical Power Transmission Apparatus was held recently at the American Engineering Societies' Building here where a comprehensive plan to codify rules for safeguarding transmission equipment was outlined. Carl B. Auel, chairman, presided.

Optimism is Shown in Chrysler Report

**\$3,000,000 Decline for Quarter
and Increase for Nine
Months, Shown**

DETROIT, Oct. 16—Walter P. Chrysler, chairman of the board, in a statement made today to stockholders of the Chrysler Corp., cited a number of reasons why he believed the automobile industry was never in a more sound condition. Plans for the future of his company, he said, are being rapidly developed to promote its future progress.

The Chrysler Corp. reported a consolidated net profit of \$24,730,419 for the nine months ended on Sept. 30 after interest, Federal taxes and other charges, and third-quarter earnings of \$6,635,179, a decrease of more than \$3,000,000 from the third quarter last year.

The earnings for the first nine months were equivalent to \$5.55 a share on the 4,452,615 shares of no par common stock outstanding, as compared with earnings totaling \$21,786,276 equivalent to \$4.94 a share on 4,407,296 shares in the corresponding nine months of last year.

For the third quarter this year the earnings were equal to \$1.49 a share on 4,452,615 shares, against \$9,257,066, or \$2.07 a share in the preceding quarter, and \$10,095,797, or \$2.29 a share, in the September quarter of 1928. The balance sheet as of Sept. 30 shows net current assets of \$88,439,469, an increase of \$1,731,614 for the third quarter and an increase of \$10,596,311 for the first nine months. The ratio of current assets to current liabilities, after provision for the regular dividend for the fourth quarter, was 3.81 to 1 on Sept. 30, compared with 3.38 to 1 on Dec. 31, 1928.

Commenting on the report Mr. Chrysler said:

"The third-quarter earnings fell somewhat below the corresponding period last year, due to several causes, prominent among which were a decrease in the volume of sales and a lapse in production of Chrysler cars incidental to the delay in securing bodies for our new models. Notwithstanding these circumstances, the corporation earned its dividends substantially twice over and materially improved its financial position as indicated by its balance sheet."

Cash and marketable securities on Sept. 30 were \$56,922,352, an increase of \$5,243,357 over June 30 and of \$3,652,359 over the beginning of the year. On Sept. 30 cash and marketable securities exceeded current liabilities by \$25,461,251.

The statement said in part: "In forming a judgment of the present state of the automobile industry, it should be borne in mind that more passenger cars were produced in the first nine months of this year than the full 12 months of

1928. This tremendous rate of acceleration in the industry could not reasonably be expected to continue indefinitely and under the circumstances it is not surprising the third quarter just passed saw some recession in production and shipments, nor is it to be expected that the fourth quarter of this year will see any resumption of operations at record-breaking rates.

"The facts of the matter, as nearly as can be ascertained at this date, are that the retail sales of automobiles, other than Fords, for the third quarter of this year were approximately 89½ per cent of the same period last year, but during the same period production was cut back to about 82 per cent of past year.

"Automobiles are now unquestionably a staple commodity in American life, and are of rapidly growing importance to the whole world. The domestic replacement market, the rapid growth of the two-or-more-car family consumer, and the almost limitless possibilities of the export market afford an opportunity for continued development which cannot be denied.

"The resumption by the Ford Motor Co. this year of large quantity production has undoubtedly been the occasion for some adjustment among other manufacturers in the industry. The whole industry, however, has developed during the past decade or more, with the Ford car in a position of almost unquestioned domination of the low priced field, and probably no other single factor has contributed as much to the motorization of the American people in so short a time. The return of the Ford to this accustomed place need be the occasion for no alarm or concern on the part of automobile manufacturers catering to a higher-priced field, but should rather be viewed with satisfaction as again providing the foundation of a future market for their products, among those who, from time to time, graduate into the class of automobile users who demand a motor of such standards as can only be provided at a higher price."

De Guichard Resigns

DETROIT, Oct. 17—Basil W. De Guichard, president and general manager of the AC Spark Plug Co., has resigned. Ill health made necessary relinquishment of his duties, which are being assumed by H. H. Curtice, vice-president and general manager. For the past eight months Mr. De Guichard has been in poor health, most of the time having been under the care of physicians at his home and at a Battle Creek sanitarium.

During the two years he has guided the administration of the AC plant the company has made many expansions besides having experienced the two best years. Mr. De Guichard has been actively engaged in the automobile field since the infancy of the industry and has been general manager of the AC company since 1922. He was elevated to the presidency of the company in November, 1927.

Schumann Elected G.M.A.C. President

**Cooper Resigns to Enter Other
Activities; New Head
is Veteran**

NEW YORK, Oct. 17—Alfred P. Sloan, Jr., president of General Motors Corp., announces the resignation of C. C. Cooper from his various official positions within the General Motors Group. His principal positions were the presidency of General Motors Acceptance Corp. and the Chairmanship of General Exchange Insurance Corp. Mr. Cooper, who has been president of the Acceptance Corporation since 1921, is relinquishing his duties to devote his time to other activities which, however, have not sufficiently developed to warrant announcement at this time.

John J. Schumann, Jr., formerly vice-president, succeeds him as president of G.M.A.C. and chairman of the General Exchange Insurance Corp. Mr. Schumann has been identified with the management of these organizations since their inception. He was elected vice-president in charge of financial operations of G.M.A.C. in 1921 and more recently has been in charge of all administrative functions as well. He has also brought to G.E.I.C. the benefit of his experience in the investment field, prior to his identification with General Motors. Mr. Schumann is also officially connected with various other subsidiary operations.

At a meeting of the Board of Directors of the G.M.A.C., Ira G. McCreery, vice-president of G.M.A.C., and Livingston L. Short, president of the G.E.I.C., were elected directors.

Hupp Shipments Gain

DETROIT, Oct. 16—Shipments of Hupp Motor Car Corp. this month will set a new October record and will total in excess of 5500 cars, according to R. S. Cole, vice-president in charge of sales. This will exceed shipments of 4129 cars in October, last year, by more than 35 per cent. Retail sales so far this month have sustained the high rate of shipments, it is said. Unfilled orders practically equal shipments in the first twelve days of October. Despite heavy shipments in the last ten days of September, which brought the total for that month to a new all-time record of 8584 cars, dealers' stocks actually show a decrease compared with a year ago. On Oct. 5 of this year, dealers' stocks in the United States and Canada were 7167 cars against 7450 on Oct. 6, last year.

Packard Executives Sail

DETROIT, Oct. 17—H. W. Peters, vice-president in charge of distribution of the Packard Motor Car Co., and B. C. Budd, general manager of Packard Motors Export Corp., sailed recently from New York for a two months' tour of Europe.

Men of the Industry and What They Are Doing



H. W. Fortey

who is in charge of the new Canadian sales division of the Marmon Motor Car Co. He was Canadian sales manager of the Chandler Motor Car Co. until a few months ago

Danford is Promoted

M. E. Danford, for more than seven years works manager of the Middletown division of the American Rolling Mill Co., has been appointed assistant vice-president. He started his career with Armco in 1910, when he came to Middletown as superintendent of the open hearth department of the Central works plant. In that capacity he helped to plan and supervise the building of the open hearth furnaces at the East Works plant.

Campbell Still in Hospital

Colin Campbell, vice-president in charge of sales of the Willys-Overland Co., is still convalescing at the Ford Hospital, Detroit, where he was taken several weeks ago, following a sudden illness while en route from Buffalo to Detroit.

Mohr Joins Gunite

Edwin J. Mohr has been appointed manager of industrial sales of the Gunite Corp. of Rockford, Ill.

Milner is in Europe

W. R. Milner, one of the "four horse-men" engineering team of the Oakland Motor Car Co., is in Europe to attend the autumn showings of new automobiles at both Paris and London.

Curtiss-Wright Elects

The board of directors of Curtiss-Wright Corp. have elected J. A. B. Smith, formerly secretary and treasurer of Curtiss Aeroplane & Motor Co., executive vice-president; Walter H. Beech, president of Travel Air Co., vice-president, and J. F. Prince, treasurer of Wright Aeronautical Corp., treasurer. Mr. Beech will become president of the new sales company to handle the sales of the commercial airplane products of the constituent companies, and has been named chairman of the sales committee of the Curtiss-Wright Corp., according to a statement made by C. M. Keys, president of the corporation.

Charles Lawrence, who was elected a vice-president of the Curtiss-Wright Corp. last June, has been named chairman of the technical committee of the corporation. He has already coordinated the engineering department, both in motors and airplanes, and has built up under his control a strong research organization.

Leland Heads Triplex Sales

C. F. Leland has been appointed sales manager of the Triplex Safety Glass Co. of Clifton, N. J. He severed a connection of 18 years with the Wayne Co., formerly the Wayne Oil Tank & Pump Co., which he served as manager of the eastern division and district manager.

Homer Now With Consolidated

Arthur P. "Pat" Homer, formerly with the Waltham Watch Co. and the Homer Oil Co., has been appointed director of sales promotion for the Consolidated Instrument Co. of America, Inc., New York.

Black & Decker Changes

The Black & Decker Mfg. Co., Towson, Md., announces the following personnel changes:

Phil Lund has been appointed to cover the territory formerly traveled by Arch Roth, who resigned.

F. A. Weisenberger succeeds W. R. Cantell in the Pittsburgh territory, covering western Pennsylvania and West Virginia.

J. W. Henderson succeeds Ross Martin in northeastern Texas and northern Louisiana.

S. B. Holmes succeeds H. B. Morrow, in Canada, covering the provinces of Alberta, British Columbia, Manitoba and Saskatchewan.

Ernest C. Adams succeeds B. L. Brown in Alabama, southern Louisiana, Mississippi and western Tennessee.

Durant Appoints Stone

C. A. Stone has been appointed a wholesale representative for Durant Motors assigned to the Chicago district.



George D. Keller

who has been appointed manager of branches for Studebaker, succeeding C. K. Whitaker, who has been placed in charge of the New York retail branch. His connection with Studebaker began in 1914

Pearson Joins Durant

A. M. Pearson, consulting transportation engineer and technical journalist, has joined the advertising division of Durant Motors. His early training in the automobile industry began 17 years ago when he took charge of the truck department of the Packard Motor Car Co. in Philadelphia. Later he held like positions with White in Boston and Locomobile in Philadelphia.

U. S. Rubber Promotes Two

J. S. O'Shaughnessy, formerly director of sales for the DuPont Viscoloid Co., and Earle Bryant, who for the past several months was manager of the Detroit plant, have been named assistants to the general manager of the United States Rubber Co.

Carver is Franklin Distributor

Harry T. Carver, Jr., has been appointed Michigan distributor for Franklin. For the past five years he has had the retailing of the Hudson-Essex line.

Hyle Joins Robert Bosch

Howard D. Hyle has been appointed district representative for the trade sales division of the Robert Bosch Magneto Co., Inc. He was formerly with the Electric Equipment Co., Los Angeles.

General Motors Radio Corporation Is Formed by Union of 4 Big Concerns

NEW YORK, Oct. 14—Alfred P. Sloan, Jr., president of General Motors Corp., and David Sarnoff, executive vice-president of the Radio Corp. of America, made the following announcement today:

"As a result of negotiations during the last few weeks, General Motors Corp. has just concluded an agreement with the Radio Corp. of America, General Electric Co. and Westinghouse Electric & Mfg. Co., under which it proposes to enter the radio business in a large way.

"A new corporation, to be called General Motors Radio Corp., has been organized with a capital stock of \$10,000,000 preferred and 1,000,000 common shares of no-par value. The Radio group is to contribute \$4,900,000 in cash and to grant licenses under all their patents covering radio-sound and picture-receiving and reproducing sets for use in homes and automotive vehicles. General Motors is to subscribe \$5,100,000 in cash and to assume the management of the new enterprise.

"The Radio group, consisting of Radio Corp. of America, General Electric and Westinghouse companies will own 49 per cent and General Motors 51 per cent of the total stock.

"Not only do we believe that there is a great opportunity for the development of the radio business as an adjunct to the automobile, but the radio field in general is one that is closely related

to the automobile and electric appliance business, in which the General Motors is engaged.

"The Radio Corp. of America will continue independently as heretofore, both as to the manufacture and distribution of its products, and the General Motors Radio Corp. will develop its business along separate lines. The Radio Corp. and the General Motors Corp. will cooperate to make the new arrangement a success."

Speaking for the General Motors Corp., Mr. Sloan said: "New Cadillac and LaSalle cars have been designed for radio installation and thousands of installations have already been contracted for by dealers. As quickly as possible the same facilities will be available for other makes of General Motors cars."

The board of directors of the General Motors Radio Corp. follows: John Thomas Smith, vice-president and general counsel of General Motors Corp., chairman; R. J. Emmert, president, General Motors Radio Corp.; General James G. Harbord, president, Radio Corp. of America; John L. Pratt, vice-president General Motors Corp.; Andrew W. Robertson, chairman of the board, Westinghouse Electric & Mfg. Co.; David Sarnoff, executive vice-president, Radio Corp. of America; Alfred P. Sloan, Jr., president General Motors Corp.; Gerard Swope, president General Electric Co., and C. E. Wilson, vice-president General Motors Corp.

Buick Names Younggren and Forbes to New Posts

DETROIT, Oct. 16—Announcement has been made by the Buick Motor Co. of the appointment to the posts of assistant chief engineers of H. T. Younggren and Kingston Forbes. Mr. Younggren who until recently was executive engineer of the Studebaker Corp., will be in charge of the power-plant, chassis, electrical engineering, chassis units, body, dynamometer and road test divisions. Mr. Forbes, who has been with Buick in the capacity of executive engineer, will be in charge of color engineering, executive engineering, drafting, sales service, specifications, technical material, experimental manufacturing, experimental engineering, garage and show rooms.

Breaks Registration Record

COLUMBUS, OHIO, Oct. 17—The total registration of motor cars in Franklin County, which includes the City of Columbus, has reached the total of 100,013 for the first nine months of the year, according to Arthur J. Thatcher, county auditor. This is the first time that the registration has passed the 100,000 mark.

In the City of Columbus there are 78,503 cars while 11,967 are outside of the city, including various villages.

The total fees for registration of this number of motor cars totals \$730,077, which amount is to be divided between the state, City of Columbus, Franklin County and other political subdivisions. All goes for road improvement and maintenance.

Eggleston Coach Company Reorganization Completed

GRINNELL, IOWA, Oct. 12—The Eggleston Coach Co., incorporated with \$1,000,000 authorized capital, has been formed to take over plant equipment, patents and rights of the Eggleston Compartment Coach Co. as well as the patents and goodwill of J. D. Eggleston, inventor of the new type passenger and freight buses.

Types of the coaches are already in service. J. D. Eggleston becomes president of the company; T. A. Potter, Mason City, vice-president; B. L. Bradford, Des Moines, secretary-treasurer, and W. H. Herzog, Baxter, assistant secretary. The company will issue 2500 shares 7 per cent cumulative preferred and 7500 shares of common.

Raybestos Earnings Up

NEW YORK, Oct. 17—Raybestos-Manhattan, Inc., for the third quarter reports net earnings of approximately \$1,300,000 after all deductions and taxes. This is equivalent to \$1.92 a share on the 676,000 shares outstanding.

Tire Price Raise is Expected Soon

Goodyear and General Take Lead in Announcing New Schedules

AKRON, Oct. 16—A general increase in the price of automobile tires is expected to become effective soon. The Goodyear Tire & Rubber Co. has advanced prices to dealers and was followed by the General Tire & Rubber Co., and it is understood that the United States Rubber Co. and the other large manufacturers of tires have conferred in regard to an upward revision of prices and will announce new schedules. B. S. Wilson, vice-president of the Goodyear company, said:

"The Goodyear Tire & Rubber Co. in its new price list to dealers, which constitutes the only price regulated by the company, has made an upward revision in the schedule averaging around 1 per cent, and less than 2 per cent, effective Oct. 15."

The matter of the increase in prices has been under discussion by representatives of the leading rubber companies for some time. The main purpose of the discussions has been to eliminate the cut-price dealer, who has made it impossible for smaller dealers to make a reasonable profit. During the past year the dealers have received a very slim profit, due to the prices at which they have been selling tires to meet competition from concerns which have received unusual discounts because of their large buying ability.

Dealers generally expressed satisfaction with the unofficial reports they received of the new Goodyear schedule yesterday, looking at the action as the one means by which tire prices, both retail and wholesale, could now be stabilized.

General and Kelly Raise Prices

NEW YORK, Oct. 16—Service-station prices on all tires except truck and bus balloon types were increased 10 per cent yesterday by the General Tire & Rubber Co. Truck and bus balloons were advanced 20 to 22 per cent.

The Kelly Springfield Tire Co. advanced prices to dealers approximately 1 per cent. The advance to consumers ranged from 5 to 10 per cent.

Traveling Salon Opens

PHILADELPHIA, Oct. 14—The "traveling salon" of Lincoln automobiles opened officially here today at the Bellevue-Stratford Hotel, following six weeks of showing at Atlantic City. Ten body types, including custom-built coach work by Dietrich, Le Baron, Brunn and Judkins, and standard bodies by Lincoln, are being shown, according to Frank A. Alter, director of salons, who is in charge of the exhibit.

General Motors Car Deliveries Decline

Dealers Report 145,171 Units Were Sold in September, Company Says

NEW YORK, Oct. 18—General Motors dealers delivered to customers 145,171 cars during September, according to an announcement by Alfred P. Sloan, Jr., president. This compares with 148,784 for the corresponding month a year ago, and with 173,884 in August of this year.

Deliveries by General Motors divisions to dealers were 146,483 as compared with 167,460 in September, a year ago, and with 168,185 in August, 1929.

The following tabulation shows monthly sales of General Motors cars by dealers to ultimate customers and sales by the manufacturing divisions of General Motors to their dealers:

Dealers Sales to Users		
	1929	1928
Jan.	104,488	107,278
Feb.	138,570	132,029
Mar.	205,118	183,706
Apr.	223,303	209,367
May	214,870	224,094
June	194,705	206,259
July	181,851	177,728
Aug.	173,884	187,463
Sept.	145,171	148,784

Divisions Sales to Dealers		
	1929	1928
Jan.	127,580	125,181
Feb.	175,148	169,232
Mar.	220,391	197,821
Apr.	227,718	197,597
May	220,277	207,325
June	200,754	186,160
July	189,428	169,473
Aug.	168,185	186,653
Sept.	146,483	167,460

G. E. Orders Show Increase

SCHENECTADY, N. Y., Oct. 17—Orders received by the General Electric Co. for the three months ended Sept. 30, totaled \$116,688,014, compared with \$90,328,666 for the corresponding quarter of 1928, an increase of 29 per cent, Gerard Swope, president, announced. For the nine months ended Sept. 30, orders received amounted to \$337,404,470, compared with \$260,686,463 for the first nine months of last year.

Financial Notes

Company	Announces	Amount	Notes
Durant Motors	init. quar. div.	\$0.20	
Mengel Co.	reg. quar. div.	.50	on common
Willys-Overland	reg. quar. div.	.30	on common; \$1.75 on pref.
Auburn	net 8 mos. earnings	6.72	net 9 mos., \$17.85
Budd Wheel	net 8 mos. earnings	6.60	
Motor Products	extra dividend	3.00	
Kinner Airplane	net August earnings	38,500.00	
Twin Coach	net profits 9 mos.	350,000.00	(first 9 mos. 1928, \$260,000)
Autosales Corp.	gross sales 9 mos.	1,137,000.00	(entire year 1928 \$1,050,000)
Weatherproof Body	gross sales 9 mos.	1,230,439.00	(first 9 mos. 1928, \$776,891)
Ohio Seamless Tube	reg. quar. div.	1.00	
Muskegon Motor Spec.	net 9 mos. earnings	460,000.00	(first 9 mos. 1928, \$397,810)
Sterling Truck	net income 9 mos.	317,757.00	(first 9 mos. 1928, \$96,625)

Dull Steel Market Seen as Transitory Condition

NEW YORK, Oct. 17—The steel market lives in the triple hope that some improvement in automotive demand will materialize next month, that first-quarter 1930 buying will get under way the middle of December, and that the volume of orders for shipment during that period will more than make up for the snail pace of buying now in evidence.

The present dullness is looked upon as strictly transitory, and those who would take advantage of what easing-off in prices has taken place must furnish specifications before the end of the month, so that their orders will actually serve the purpose of tiding mills over their present difficulties.

Non-integrated sheet and strip rollers are bringing some pressure to bear on producers of semi-finished steel to recognize the change that has come over the market for the time being, and to shade the \$35 per ton price on sheet-bars and billets.

Wire rods are down \$2 per ton from what they were quoted a month ago, \$40 now being named.

Cold-finished steel bars and automotive alloy steels are in slow demand, with prices nominally unchanged.

Pig Iron—Automotive foundries are buying largely from hand to mouth, preferring to await developments before anticipating their requirements by more than a fortnight. Foundry iron for delivery in the Michigan territory continues to be quoted at \$20. Valley furnaces quote \$18.50 for foundry and \$19 for malleable.

Aluminum—Middle West automotive foundries are reported to be taking more interest in offerings of remelted aluminum. The market for virgin metal is unchanged.

Imports are on the uptrend.

Copper—Favorable statistics from the producers' point of view failed to stimulate demand from consumers who have to cover their requirements in the open market. Most of these are believed to have sufficient metal contracted for to carry them through.

Lead—The market is steady. Storage battery demand is fair.

Zinc—While producers predict the coming of a buying movement, demand so far is of a strictly routine character.

Rubber Exchange Elects

NEW YORK, Oct. 16—Rubber Exchange of New York, Inc., held its annual election yesterday and reelected Francis R. Henderson for his fourth term as president. Other officers were elected as follows: Charles T. Wilson, vice-president; J. Chester Cuppia, treasurer, and members of the board of governors: Harold L. Bache, William E. Bruyn, James T. Bryan, Herbert S. De Lanie, J. Frank Dunbar, Jr., John L. Handy, John L. Julian, David S. Kubie, Jerome Lewine, Fred Pusinelli, William H. Stiles and Edward J. Wade.

Ryerson Sells Line

CHICAGO, Oct. 17—Joseph T. Ryerson & Son, Inc., has sold its complete line of table and floor horizontal boring, drilling and milling machines to the Ohio Machine Tool Co. of Kenton, Ohio. The Ryerson company, however, will retain the sole rights as exclusive distributors of the line.

Merger Plans Completed

NEW YORK, Oct. 16—Deposit of stock of the Southern Asbestos Co. for the merger of that company with Thermoid Co. has reached approximately 90 per cent and the plan has been declared operative.

Automobile Financing

WASHINGTON, Oct. 16.—The number of automobiles financed during the first six months of the current year, as reported to the Department of Commerce by 338 automobile financing organizations, was 1,634,392, on which \$760,611,319 was advanced. This summary inaugurates a new monthly compilation and will be subject to revision in subsequent issues as reports are received from additional concerns. Detailed statistics are given below, by months, new and used cars being shown separately. Thirty-eight of the smaller firms found it impossible to segregate their operations; their totals are shown in the unclassified group.

1929	Total		New Cars Financed		Used Cars Financed		Unclassified	
	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars	Number of Cars	Volume in Dollars
January	138,185	\$66,348,490	71,904	\$44,440,562	62,761	\$20,298,416	3,520	\$1,609,512
February	168,104	79,978,315	96,754	57,193,167	67,832	21,170,409	3,518	1,614,739
March	272,537	127,240,421	155,947	90,913,462	111,600	34,204,002	4,990	2,122,957
April	342,579	158,465,353	193,409	113,085,791	144,021	43,080,865	5,149	2,298,697
May	361,362	166,063,699	199,959	117,078,571	155,801	46,538,369	5,602	2,446,759
June	351,625	162,515,041	192,950	114,375,561	153,657	45,926,932	5,018	2,212,548
Total (6 mos.) ...	1,634,392	\$760,611,319	910,923	\$537,087,114	695,672	\$211,218,993	27,797	\$12,305,212

Business in Brief

Written by the Guaranty Trust
Co., New York, exclusively for
AUTOMOTIVE INDUSTRIES.

NEW YORK, Oct. 17—Trade last week increased with the more seasonable weather; but, although business in general is still more active than a year ago, the difference is much less marked than in the earlier part of the current year. Several of the heavier industries are operating at levels above that a year ago, but the rate of activity is less than that earlier in the year. Collections are rather slow.

CHAIN STORE SALES

Sales of 36 leading store chains during September amounted to \$212,321,068, showing an increase of \$35,044,998, or 19.76 per cent over those in the corresponding month last year.

CONSTRUCTION

Construction contracts awarded in 37 Eastern States during September amounted to \$445,402,300, according to F. W. Dodge Corp., which marks a decline of 9 per cent below those awarded during the preceding month and a decline of 24 per cent below those a year ago.

CAR LOADINGS

Railway freight loadings for the week ended Sept. 28 totaled 1,202,111 cars, the highest for any one week so far this year, and mark an increase of 5146 cars over those in the corresponding week last year and an increase of 75,208 cars over those in the corresponding week two years ago.

FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Oct. 12 stood at 94.7, as compared with 94.7 the week before and 95.8 two weeks before.

FEDERAL RESERVE STATEMENT

The consolidated statement of the Federal Reserve banks for the week ended Oct. 9 showed a substantial credit contraction. There were decreases of \$73,300,000 in holdings of discounted bills, of \$5,000,000 in holdings of Government securities, and of \$59,900,000 in member bank reserve deposits, while there was an increase of \$10,300,000 in holdings of bills bought in the open market. The reserve ratio on Oct. 9 was 74.4 per cent, as against 72.7 per cent a week earlier and 73.8 per cent two weeks earlier.

Hunt Appoints Wheels, Inc.

NEW YORK, Oct. 17—Wheels, Inc., has been appointed the eastern representative for the Geo. L. Hunt Equipment Co., Davenport, Iowa, as distributor of its axle press and wheel straightener.

Announce Detroit S.A.E. Sessions

DETROIT, Oct. 17—The body division of the Detroit Section, Society of Automotive Engineers, will hold a meeting on Oct. 22 with Lee Anderson, president of Advertisers, Inc., as the speaker. A. C. Downey, purchasing agent of

Graham-Paige Celebrates



George H. Petersen, factory manager, left, about to cut the cake which was baked to mark the twentieth anniversary of the founding of the old Paige-Detroit Co., acquired in 1927 by Graham interests. Robert C. Graham, vice-president, is assisting. Executives who have been with the organization for 10 or 20 years were guests. Mr. Petersen helped to build the first automobile made by the Paige factory more than a score of years ago

Chrysler Motors, will address the general section meeting Nov. 11 on the subject, "What the Purchasing Agent Thinks of the Engineer."

Ohio Employment Drops

COLUMBUS, OHIO, Oct. 17—The Bureau of Business Research, in a bulletin covering employment in the automobile and automotive parts industries in Ohio, showed that September employment was 1 per cent less than that of August, this year, and 4 per cent greater than in September, 1928.

Pratt & Whitney Sales Mount

NEW YORK, Oct. 16—Pratt & Whitney Aircraft Co. of Hartford, Conn., during the past two weeks has closed contracts with the United States Army Air Corps for a total of 380 engines and a large complement of spare parts. The value of these orders is approximately \$2,355,000. The company is a subsidiary of the United Aircraft & Transport Corp.

Hudson Breaks Production Record

DETROIT, MICH., Oct. 17—The Hudson Motor Car Co. has produced and sold more cars in the first nine months of 1929 than in the entire year of 1928. Total for the nine months to Oct. 1 is 284,382 Hudson, Essex and Dover cars, as against 282,207 in all of 1928.

Bendix Inaugurates Huge Building Plan

Comprehensive Project to Begin With Aviation Unit at Chicago

CHICAGO, Oct. 17—Plans for a huge expansion program of the Bendix interests centered in South Bend, Ind., have just been announced by the Bendix Aviation Corp. here. The chief feature of the program is the construction of a new plant to be known as Project No. 1, to house the new activities of the aviation unit.

It is estimated that with the completion of this new building, from 1000 to 1500 employes will be added. In addition to the new factory building, Bendix will complete other units of the administration building, which, with the additions, then will be 650 feet in length.

A new plant addition also will be started immediately in the rear of the administration building, which will be 560 x 150 ft. The company also is just now completing the installation of a depressed rail track with an inclosed shipping platform on the north side of the present factory buildings, and south of the projected new buildings.

On the south of the present plant between the administration building and Plant No. 10, Bendix Brake Co. is building a new structure 300 x 200 ft. A foundry building will be erected, measuring 200 x 100 ft. in the rear of the present plant. The present forge plant will be moved south to a point in the rear of the present Bendix plant and along the New York Central right of way. A new boiler house also is planned.

Navy Accepts All-Metal

Dirigible Following Test

WASHINGTON, Oct. 16—The Navy Department has officially accepted the all-metal dirigible ZMC-2. Recommendation that the ship be accepted was made by the Board of Inspection and Survey following test trials. The contract required that the craft fly at a speed of 60 miles per hour as a minimum. In the tests it exceeded this rate but it was stated that it has never been flown at its maximum speed. Among tests made also were those to determine the ascending and descending qualities of the ship and to ascertain whether the metal covering was gas tight or not.

The dirigible has been accepted as an experimental type and will be subjected to extensive operating tests so that data may be gathered for purposes of comparison with fabric-covered ships.

Firestone Buys Warehouse

NEW BEDFORD, MASS., Oct. 16—The Firestone Tire & Rubber Co. has expanded its holdings in Massachusetts by taking over the Bellville warehouse, one of the big properties of the Manomet Mills Corp.

A.A.A. Will Launch Safety Campaign

Effort to be Made to Curb Fatalities in Outlying Metropolitan Areas

WASHINGTON, Oct. 17—An effort to curb the mounting number of fatalities and accidents, as well as to reduce the economic loss of millions of dollars due to traffic congestion in outlying metropolitan areas, was launched in the national capital today at the initial session of the A.A.A. Committee on Highway Widening and Segregation of Grades. Thomas P. Henry, president, who named the committee to study the subject of highway widening in an effort to formulate a national policy, declared that it is one of the most far-reaching and acute problems ever undertaken by motordom.

"Metropolitan centers have been focusing attention on their mid-city congested areas and state highway officials on the open country," said Mr. Henry, "with the result that the problem of outlying city and suburban areas has not received proper attention."

Charles M. Hayes, president of the Chicago Motor Club, member of the A.A.A. National Executive Committee, and one of the foremost authorities on highway widening, is chairman of the committee and will have an important part in shaping its program.

William S. Kelley

NEW YORK, Oct. 17—William S. Kelley, who claimed to be the inventor of the pneumatic tire and of a tire valve which provided the basic principle for valves now in use, died yesterday at the home of his daughter, Mrs. Fred Graff, in Essex Falls, N. Y. He was 89 years old.

He worked for the Smith Machine Works in Smithville, N. J., and it was there, when they were making bicycles back around 1880, that he developed the idea of the pneumatic tire as making for easier riding than the solid tires then in use. Kelley never patented either of his inventions.

McQuay-Norris Adds to Lines

ST. LOUIS, Oct. 15—More than 400 new numbers of pistons, pins, valves, bearings, bolts and bushings have been added to the McQuay-Norris line since the beginning of the year. Inasmuch as piston rings are sold by sizes rather than stock numbers, and McQuay-Norris has at all times more than 4000 sizes in stock, the additions to this line are not included in the above figures.

When the McQuay-Norris line is presented to the wholesalers at the M.E.A. and N.S.P.A. Shows this fall, there will be two new products: the McQuay-Norris double ventilated Super-oil ring and the special double-lock-ring type full-floating piston pin for Ford Model A cars.

Reo Subscribes to Miller's Proposal To Gear Production Down to Markets

LANSING, MICH., Oct. 17—Following the recent statement made by L. A. Miller, president of Willys-Overland Co., Toledo, warning that the race for production records is undermining the financial and credit structure of the nation and is creating a very serious situation for car dealers, Richard H. Scott, president of Reo Motor Car Co., said in a letter to Mr. Miller that he subscribed to the Willys-Overland program of gearing production schedules to the legitimate absorptive capacity of the market.

Mr. Scott decried the mounting of production records during the past eight months while the market has not grown proportionately. He denied that there was a used car problem, holding that this is merely a painful symptom of the overproductive condition into which the industry has allowed itself to be beguiled.

"We gladly subscribe to your announced program of gearing production schedules to the legitimate absorptive capacity of the market. Perhaps I should rather say that we welcome most heartily so important an acces-

sion to our own thinking on this vitally important subject as the head of the Willys-Overland Co. This is the policy to which we have rigidly adhered throughout our 25 years of operation.

"We have viewed with no little apprehension the mounting of production records during the first eight months of this year—because we know that the market had not grown proportionately. While we were consistently holding our own production schedules level with retail sales, we saw steadily mounting stocks of new cars in the hands of dealers handling many other lines.

"And we were hearing constantly of the dangers both present and potential of the growing seriousness of the so-called used car problem.

"We have consistently contended, and we are glad to note that you agree with us, that there is no used car problem. The used car problem is merely one of the very painful symptoms of the condition of overproduction into which the industry has permitted itself to be beguiled.

"You may count upon our cooperation to the fullest extent."

Dare Airplane to Build Big Plant Near Detroit

DETROIT, Oct. 17—The Dare Airplane Company has announced that it will locate its manufacturing plant at Milan, Mich., 32 miles from Detroit on the Dixie Highway. The project includes a 400-acre airport and a 2-story factory building, 80 x 130 ft., affording about 25,000 sq. ft. of floor space.

According to F. G. Dunn, vice-president and managing director, the company is a closed corporation capitalized at \$500,000. Plans call for production of 14 ships between now and the first of the year, 20 in January and 25 in February, 30 in March, 35 in April, 40 in May and 50 each month thereafter, until October, when production will be placed according to demand. All Dare ships will be of standard commercial designed, except for the variable camber wing, according to officials, embodying high speed and lift low landing speed adaptable to land and water use, and interchangeable from passenger to cargo ships.

Hall to Make Chrysler Lamps

DETROIT, Oct. 17—The C. M. Hall Lamp Co. has obtained contract from Chrysler Corp. covering lamp requirements for 1930 for the Chrysler 66, 70 and 77 and 80 lines, according to W. F. Anklam, president of the lamp company.

Outboard Plant Nears Completion

MILWAUKEE, Oct. 16—The Evinrude plant addition, under construction here, expected to be completed on Nov. 1, will be the largest factory in the outboard industry. As soon as the new

addition is ready for occupancy, both the Elto division, Milwaukee, and the Lockwood division, Jackson, Mich., of the Outboard Motors Corp., will be moved to this plant.

Stutz Business Increases

INDIANAPOLIS, Oct. 15—September business in Stutz cars showed marked increases over the same period of 1928 and consistent gains over the preceding month of August, according to an announcement just made public by Col. E. S. Gorrell, president of the Stutz Motor Car Co. of America. September's orders were 71 per cent greater than those received during the same month last year; retail deliveries were 56 per cent more than September of 1928, and 1929 shipments to date are 69 per cent above the same period last year.

Working on Lighter Seats

DETROIT, Oct. 17—Laboratory experiments are being carried on by the American Aluminum Co. at its Buffalo plants under an arrangement with the Ypsilanti Reed Furniture Co. of Ionia, Mich., for the production of aluminum and airplane seats at the Ionia factory, according to Fred A. Chapman, president of the Reed company.

Complete U. S. Rubber Transfer

DETROIT, Oct. 17—Transfer of tire manufacturing and administration of the United States Rubber Co. to Detroit has been completed, according to an announcement by L. D. Tompkins, vice-president and general manager of the tire division.

Voisin Breaks World Distance and Speed Records Up to 30,000 km., at Nearly 83 m.p.h.

PARIS, Oct. 15 (Special)—Running on Monthlery track, a special 12-cylinder sleeve valve Voisin, driven by Marchant, Morel, Kiriloff and Leroy de Presale, has broken all world's speed and distance records up to 30,000 km., which distance was covered in 224 hr. 39 min. 58 78/100 sec., or at an average of 82.97 m.p.h. The 20,000-mile record was secured in 241 hr. 43 min. 40 90/100 sec., or at 82.73 m.p.h.

By this performance the Voisin broke nearly all the records established by a Studebaker at Atlantic City last year, and also set up new records for one day up to 10 days, inclusive, recently recognized by the International Sporting Commission on the recommendation of the American Automobile Association.

After covering 30,000 km., Gabriel Voisin announced that his car would be stopped at 40,000 km., this being about equal to the distance around the world at the equator, and that he would voluntarily leave the Studebaker the records for 30,000 miles and 45,000 km. When within a short distance of the 35,000 km. mark, however, the Voisin turned over at speed and Kiriloff was taken to a hospital with a fractured skull.

The car used for these records is a special Voisin with a 12-cylinder sleeve valve engine of 86 by 130 mm. bore and stroke (3.39 by 5.12 in.). The cylinder blocks were taken from stock, but the three-bearing crankshaft, which is more than 4 in. diameter, was built specially, and the crankcase was built up of welded sheet steel.

While the Voisin was running, a six-cylinder Hotchkiss was also out for the new records. It ran continuously for 16 days, during which time it covered 25,305 miles, or an average of 65.9 m.p.h.

The Voisin, being a more powerful and faster car, took all the records up to 10 days, but after it stopped, Hotchkiss established new world's records for 11 to 16 days inclusive. At the end of six days the Hotchkiss had maintained an average of 71.65 m.p.h., which was the highest figure. From this point on the average dropped gradually until it reached 65.9 m.p.h. for the total distance.

Officials of the Studebaker company already have been in touch with the Racing Board of the Automobile Club of France with a view to attempting to regain their records on the French track.

Additions Leading Factor in Building

Airplane Projects Continue to Attract Attention of Contractors

PHILADELPHIA, Oct. 17—The predicted recession in automobile production is being felt in the building industry in large manufacturing centers. Plans for airplane factory additions have kept the contracting business interested, however.

Although plans for considerable original construction have been rumored, plant additions continue to lead the activity in the automobile field. Among the plans announced for construction are:

Wright Aeronautical Corp., Paterson, N. J., awarded general contract to J. W. Ferguson Co., for addition to cost \$500,000 with equipment.

De Luxe Auto Body Co., West New York, N. J., is considering new 1-story plant for parts and assembling, to cost \$40,000 with equipment.

Warwick, R. I., plans an airport to cost \$300,000, including a small machine shop and equipment.

Norma-Hoffmann Bearings Corp., Stamford, Conn., taking bids for 1 and 2-story addition to cost about \$90,000 with equipment.

Continental Airports, Inc. (Leo F. Caproni), New Haven, Conn., plans airport buildings at Milford, Conn., to cost \$100,000 with equipment.

Firestone Tire & Rubber Co., Akron, Ohio, purchased Peabody mill of Dwight Mfg. Co., Newburyport, Mass., for branch plant. Improvements planned.

Electric Auto-Lite Co., Toledo, Ohio, acquired property at Sarnia, Ont., for new Canadian branch plant, to cost \$3,000,000 with equipment.

Carter Carburetor Co., St. Louis, awarded contract for addition, to cost \$40,000 with equipment.

Topeka Airport & Aviation Co., Topeka, Kan., has filed plans for hangar with repair and reconditioning shop facilities at North Topeka-Oakland airport, to cost \$40,000 with equipment.

Fleetcraft Airplane Corp., Lincoln, Neb. (N. A. Sanders), considering plant near municipal airport at Denver for parts manufacture and assembling, to cost \$180,000 with equipment.

Ex-Cell-O Aircraft & Tool Corp., Detroit, has superstructure under way on 1-story plant unit to cost about \$100,000 with equipment.

Olds Motor Works, Inc., Lansing, Mich., planning addition to engine plant to cost \$100,000 with equipment.

Fisher Body Corp., Detroit, has asked bids on general contract for two extensions to works at Lansing, consisting of 1-story addition to factory formerly occupied by Olds Motor Works and new unit, to cost \$400,000 with equipment.

Stewart Motor Corp., Buffalo, has awarded general contract for 1-story addition, for parts production and service, to cost \$55,000.

American-LaFrance Foamite Corp., Elmira, N. Y., has awarded contract for addition, to cost \$55,000 with equipment.

General Motors Corp., Detroit, has awarded contract, for parts and service building at Pittsburgh, to cost \$150,000 with equipment.

Canadian Production May Achieve New High Level

TORONTO, ONT., Oct. 17—While production of automobiles at the Canadian plants has not been maintained at recent record levels, there is no doubt that a new high level in the history of the industry will be established for the year.

Motor trucks to the number of 43,786 were manufactured in the eight month period of the current year, ended August, this figure representing a gain of 14,592 over that of the corresponding period of last year. Production of passenger cars for the same period totaled 176,250 as compared with 152,265 in the same months of 1928.

William W. Sears

DES MOINES, IOWA, Oct. 16—William W. Sears, aged 58 years, said to have made the first automobile sale in this state, died Oct. 3 in his home here after a few days' illness of pneumonia. He was president of the Iowa Automotive Association, director of the Iowa-Des Moines National bank and prominent in civic and fraternal circles.

Chambers is Promoted

H. H. Chambers, for the past year assistant sales manager at the Caterpillar Tractor Co., Peoria, Ill., has been appointed sales manager for the firm in charge of its western division, San Leandro, Cal. I. E. Stouffer, district representative for the Caterpillar in the New York and Pennsylvania terri-

tory, will succeed Mr. Chambers as assistant sales manager in the Peoria district. I. E. Jones, whom Mr. Chambers succeeds, will become foreign representative for the company.

Tube Co. Increases Capital

DETROIT, Oct. 16—Stockholders of the Standard Tube & Manufacturing Co., Detroit, have voted to increase the capitalization from 25,000 shares of \$10 par value common stock to 50 shares Class A preferred stock, callable at \$11 a share, and 100,000 shares of Class B no par common. The products of the company include fabricated tubing parts for the automotive, aeronautic and other industries.

G.M. Holds Fall Show

DETROIT, Oct. 17—The General Motors Corp. opened its fourth fall style showing in the General Motors Building here last week. One hundred and seven models were on display, in a wide variety of new colorings. Approximately 60,000 sq. ft. of floor space was devoted to the event.

Producing 12 Planes a Month

DETROIT, Oct. 16—Production schedules of the Detroit Aircraft Corp. call for turning out of 12 planes per month at both the Ryan and the Lockheed plants, it was announced by E. S. Evans, president. Both plants are operating at this rate now. No important decline from this level during the winter is anticipated.

Huge Turbine to be Used in Ford's Rouge Factory

SCHENECTADY, N. Y., Oct. 17—The most modern turbine generator so far conceived, rated 110,000 kilowatts, is to be installed by the Ford Motor Co. in the power generating station of its River Rouge plant at Fordson, Mich., by the General Electric Co. This will be one of the first important turbine installations in the world designed to use steam at a pressure of 1200 lb. exclusively. As a result of using this high pressure, less coal will be needed to produce a given electric output.

The length is to be 57 ft. 6 in.; maximum width will be 23 ft. and a little overall height will be less than 21 ft. The approximate weight is 2,000,000 lb. The space to be occupied is less than a quarter of a cu. ft. per kilowatt of output.

French Adopt New Tax Plan

PARIS, Oct. 14 (*Special*)—French automobiles sold to foreigners having a temporary residence in France, can be delivered with a triptyque and are exonerated from the 12 per cent luxury tax, according to a recent decision of the Finance Department. This decision has been taken as the result of action by the French automobile manufacturers' association, which pointed out that American automobiles were kept in bond until sold and were delivered with a triptyque, thus paying neither import duty nor the luxury tax. This practice was perfectly legal, but it gave American makers an advantage.

Bantam Has Brass Foundry

SOUTH BEND, IND., Oct. 17—The Bantam Ball Bearing Co. has added a brass foundry to its plant to make bronze castings, required in the manufacture of ball and roller bearings.

Toronto Show Plans Are Now Under Way

TORONTO, ONT., Oct. 17—Plans are nearing completion for the holding of the National Motor Show during the week of January 11 to 18, immediately following the New York Motor Show and preceding the Eastern Canada Motor Show at Montreal, which will be held from January 18 to 25. The date of the local show is yet tentative, pending upon satisfactory completion of arrangements now in the process of consideration.

Airport Session Oct. 24

WASHINGTON, D. C., Oct. 16—The users and the builders of airports have joined forces in a municipal airport conference which is expected to draw hundreds of leaders in aviation here for its sessions Oct. 24-25. The engineers and city officials of the American Road Builders' Association who are interested in and, in many cases, responsible for the building of airports will meet with Aeronautical Chamber of Commerce of America members, which latter group embraces all commercial aeronautical interests, every element connected with the business of flying. The technical side of the program will take up airport layout and planning, structures, drainage, surfaces, management and progress.

C.I.T. to Finance "Philco" Sales

NEW YORK, Oct. 16—An exclusive contract has been signed with the Philadelphia Storage Battery Co. for financing sales of "Philco" radio sets throughout the United States and Canada by Commercial Investment Trust, Inc.

Reynolds Stockholders Will Act on Expansion

DETROIT, Oct. 17—Stockholders of the Reynolds Spring Company of Jackson, Mich., will hold a special meeting Oct. 24, to vote on a proposed increase in authorized common from 500,000 to 1,000,000 shares, and to act upon the proposal of the directors to purchase all outstanding stock of the Premier Cushion Spring Co. of Detroit for \$700,000.

Following the company's semi-annual statement, which disclosed a net profit of \$127,651 after taxes and depreciation, the directors acted favorably upon recommendation of Charles G. Munn, president, to acquire a spring plant in Detroit in order to serve the motor car manufacturing plants here for which the Reynolds company is producing springs.

Dissolution is Assured

DETROIT, Oct. 12—Definite assurance of the dissolution of Durant Acceptance Corp. is seen in the announcement of Wallace Zweiner, vice-president of the corporation, that the necessary two-thirds of the stockholders have already consented to the liquidation proposal.

Dodge Using Metric Plugs

DETROIT, Oct. 16—A recent improvement in Dodge Bros. automobiles has been the adoption of the metric spark plug in place of the 7/8-in. type usually employed.

Plan World Power Conference

NEW YORK, Oct. 17—The engineering profession and power developers and users of the United States are planning an elaborate program for the sessions of the World Power Conference, to be held in Berlin, June 16-25.

Calendar of Coming Events

SHOWS

Atlantic City, Automobile.....Oct. 21-22
National Power Show, Grand Central
Palace, New York.....Dec. 2-7
Philadelphia, Automobile.....Jan. 11-13
Buffalo, Automobile.....Jan. 11-13
Milwaukee Automobile Show.....Jan. 11-13
Cincinnati, Automobile.....Jan. 12-13
Detroit, Automobile.....Jan. 18-25
Baltimore, Automobile.....Jan. 18-25
Harrisburg, Automobile.....Jan. 18-25
Louisville, Automobile.....Jan. 18-25
Hartford, Automobile.....Jan. 18-25
Rochester, Automobile.....Jan. 20-25
Columbus, Automobile.....Jan. 26-Feb. 1
Wilkes-Barre, Automobile.....Jan. 27-Feb. 1
Wichita, Automobile.....Feb. 3-8
Cumberland, Automobile.....Feb. 3-8
Syracuse, Automobile.....Feb. 3-8
Peoria, Automobile.....Feb. 4-8
St. Louis, Automobile.....Feb. 4-9
Denver, Automobile.....Feb. 10-15
Providence, Automobile.....Feb. 14-22
Camden, N. J., Automobile.....Feb. 24-Mar. 1
Des Moines, Automobile.....Feb. 24-Mar. 1
Detroit (All-American Aircraft).....April 5-13
London, Automobiles.....Oct. 17-26
Prague, Automobiles.....Oct. 23-30
Paris, Motorcycles.....Oct. 23-Nov. 3
M.&E.A. Show and Convention, Chi-
cago.....Nov. 4-9
N.S.P.A. Show and Convention,
Detroit.....Nov. 11-16
London, Trucks.....Nov. 7-16
Paris, Trucks.....Nov. 14-24
London, Motorcycles.....Nov. 30-Dec. 7
Brussels Auto Salon.....Dec. 7

New York National.....Jan. 4-11
Newark (N. J.) Automobile Show.....Jan. 11-13
Boston Automobile Show.....Jan. 13-25
Chicago National, Coliseum.....Jan. 25-Feb. 1
Cleveland Automobile Show.....Jan. 25-Feb. 1

CONVENTIONS

Asbestos Brake Lining Assn., New
York.....Dec. 11
Ohio Assn. of Commercial Haulers,
Cleveland.....Jan. 30-31
Associated Business Papers, Chicago,
Oct. 21-22
National Hardware Association, Atlan-
tic City.....Oct. 21-24
Society of Industrial Engineers, Six-
teenth Annual Meeting, Hotel
Statler, Cleveland.....Oct. 23-25
National Battery Mfrs. Assn., Hollen-
den Hotel, Cleveland.....Oct. 24-25
Amer. Gear Mfrs. Assn., Phila.....Oct. 24-26
World Engineering Congress, Tokio,
Japan.....Oct. 29-Nov. 22
Overseas Club Dinner, Chicago.....Nov. 6
National Automotive Parts Associa-
tion, Detroit.....Nov. 6-8
National Tire Dealers Assn., Chicago,
Nov. 11-14
International Acetylene Assn., Chicago,
Nov. 13-15
National Assn. Finance Companies,
Chicago.....Nov. 19-20

American Society Mechanical Engi-
neers, New York.....Dec. 2-6
Highway Research Board, Ninth An-
nual Meeting, Washington, D. C.,
Dec. 12-13

National Automobile Dealers Associa-
tion, New York City.....Jan. 6
American Roadbuilders Association,
Atlantic City.....Jan. 11-13
American Institute Electrical Engineers,
New York.....Jan. 27-31
National Automotive Dealers Associa-
tion, Chicago.....Jan. 27-28
Southwest Road Show and School,
Wichita.....Feb. 25-28
American Society Mechanical Engineers,
Fiftieth Anniversary Celebration:
New York.....April 5
Hoboken, N. J.....April 7
Washington, D. C.....April 8-9

RACES

Edsel B. Ford Air Tour, Dearborn,
Mich.....Oct. 5-21
Los Angeles.....Nov. 17

S. A. E.

Transportation Meeting, Toronto.....Nov. 12-15
Annual Meeting, Detroit.....Jan. 21-24

SALONS

Hotel Drake, Chicago.....Nov. 9-16
Hotel Commodore, New York City.....Dec. 1-7
Hotel Biltmore, Los Angeles.....Feb. 8-15
Palace Hotel, San Francisco,
Feb. 22-Mar. 1